



HOKKAIDO UNIVERSITY

| | |
|------------------------|--|
| Title | THE GENUS PHORBIA IN NEPAL, WITH DESCRIPTIONS OF FIVE NEW SPECIES (DIPTERA : ANTHOMYIIDAE) |
| Author(s) | SUWA, Masaaki |
| Citation | Insecta matsumurana. Series entomology. New series, 50: 1-52 |
| Issue Date | 1994-02 |
| Doc URL | http://hdl.handle.net/2115/9870 |
| Right | |
| Type | bulletin |
| Additional Information | |



Instructions for use

**THE GENUS PHORBIA IN NEPAL, WITH DESCRIPTIONS
OF FIVE NEW SPECIES
(DIPTERA : ANTHOMYIIDAE)**

By MASAAKI SUWA

Research Trips for Agricultural and Forest Insects in the Subcontinent of India,
Scientific Report No. 48.

Results of Kyushu University Scientific Expedition to the Nepal Himalaya,
Diptera 15.

Abstract

Suwa, M. 1994. The genus *Phorbia* in Nepal, with descriptions of five new species (Diptera : Anthomyiidae). *Ins. matsum. n. s.* 50 : 1-52, 1 tab., 178 figs. (157 text-figs.; 21 figs. in 8 pls.).

Thirteen Nepalese species of *Phorbia* are dealt with. Of them five species, *morulina*, *minuta*, *pilosyloides*, *seticauda* and *nishidai*, are described as new to science, and two others, *subsymmetrica* Fan and *omeishanensis* Fan, are newly recorded from Nepal. They are separated into 2 groups, here called the *morula* group (10 spp.) and the *pilicercra* group (3 spp.). Two non-Nepalese species, *asymmetrica* Suwa from Japan and *gemmaullata* Feng et al. from China (Sichuan), are included in the *morula* group, and the North American *Phorbia lobata* (Huckett) probably belongs to this group. Some of the Nepalese species of the *morula* group occur also in Tibet or Sichuan, while no species of the *pilicercra* group have been recorded outside Nepal. The two groups are distinct from each other, and may have respective relatives outside Nepal. They may have originated in the Himalayas, the *morula* group having expanded north to Eurasia and even North America.

Author's address. Systematic Entomology, Faculty of Agriculture, Hokkaidō University, Sapporo, 060 Japan.

Contents

| | |
|---|----|
| Introduction | 3 |
| Genus <i>Phorbia</i> Robineau-Desvoidy | 3 |
| Key to the species of <i>Phorbia</i> known from Nepal | 7 |
| Descriptions of the species | |
| 1. <i>Phorbia morula</i> Ackland | 8 |
| 2. <i>Phorbia morulina</i> sp. nov. | 12 |
| 3. <i>Phorbia subsymmetrica</i> Fan | 15 |
| 4. <i>Phorbia minuta</i> sp. nov. | 18 |
| 5. <i>Phorbia nepalensis</i> Suwa | 20 |
| 6. <i>Phorbia omeishanensis</i> Fan | 23 |
| 7. <i>Phorbia tysoni</i> Ackland | 25 |
| 8. <i>Phorbia lobatoides</i> Suwa | 27 |
| 9. <i>Phorbia pilostyla</i> Suwa | 29 |
| 10. <i>Phorbia pilostyloides</i> sp. nov. | 31 |
| 11. <i>Phorbia pilicerca</i> Suwa | 33 |
| 12. <i>Phorbia seticauda</i> sp. nov. | 36 |
| 13. <i>Phorbia nishidai</i> sp. nov. | 39 |
| Acknowledgements | 41 |
| References | 42 |
| Appendix : Further records of <i>Phorbia</i> , with other Anthomyiidae from Nepal and India based on the collection preserved in Lund University | 42 |
| Plates | 45 |

INTRODUCTION

The genus *Phorbia* is a rather small group represented by less than 50 species in the world and mainly Holarctic in distribution. In Nepal 6 species of the genus have been known to occur (Ackland, 1967; Suwa, 1977). Their biology is little known. However, in Europe, *Phorbia haberlandti* (Schiner, 1865) and *Phorbia securis* Tiensuu, 1936 are injurious to the stems of wheat, rye, barley, and other grasses of Gramineae (Jermy, 1953, and others through Hennig, 1969). As pointed out by Hennig (l.c.), their sheath-like ovipositors may indicate that the members of the genus are similar in biology. Vast grasslands and alpine meadows in Asia offer suitable habitats for flies of *Phorbia*, and not a few species are expected to be found there.

In the present study I have examined a large number of specimens of *Phorbia* mostly collected at altitudes between 2,000 and 4,000 m in Nepal. Thirteen species have been found in the collection, and of them, 5 are new to science and 2 others new to Nepal. These species have been determined on the basis of the male. The female specimens at hand are excluded from this study, because I have not succeeded in combining them with the males. These Nepalese species are quite peculiar as will be discussed.

The specimens used here were mostly obtained under the projects the Kyūshū University Scientific Expedition to the Nepal Himalaya, 1972 (East Nepal) and the Research Trips for Agricultural and Forest Insects in the Subcontinent of India, 1983 (Janakpur and Bagmati), and on my private trips 1988 (Bagmati and Gandaki). The specimens from East Nepal are deposited in the collection of the Biological Laboratory, Kyūshū University (BLKU), and others in the Laboratory of Systematic Entomology, Hokkaidō University (SEHU), unless otherwise stated. Some specimens are deposited in the Entomolgy Division, Agricultural Department, Nepal (EDAN), and in the Natural History Museum, London (BM).

I have examined further specimens of *Phorbia* collected in Nepal and India (see Appendix). They belong to 4 species, which, however, are represented by the female only except for *P. omeishanensis*.

GENUS PHORBIA ROBINEAU-DESVOIDY

Phorbia Robineau-Desvoidy, 1830 : 559. Type-species: *Phorbia musca* R.-D., 1830 (= *Anthonomyia sepia* Meigen, 1826), designated by Coquillett (1910).

The genus, following the concept of Hennig (1976), is characterized by the club-shaped or conical abdomen, the 5th sternite with a fringe or mat of short setulae along inner margin of each process, and the simple distiphallus with a simple acrophallus in the male, and by the sheath-like ovipositor with recurved apices on the cerci in the female.

The Nepalese species are generally characterized in the male as follows: -

Body including appendages blackish in ground colour, and basically pale grey or bluish grey in pollinosity, the bluish colour often hardly discernible due to strong brownish tinge especially on dorsum of the body. Head variously tinged with brown in pollinosity; haustellar mentum pollinose. Mesonotum wholly pollinose in frontal view, usually with short black vittae along rows of *dc* posteriorly and black vittae

or patches along rows of *ia* or on lateral declivities, in caudal view largely blackish and partly pollinose in most species. Abdomen wholly pollinose in frontal view, and broadly blackish medially in caudal view. Wings tinged with brown or dark brown, much darker basally; calyptre whitish, slightly tinged with yellow especially on margin; halteres dark brown at base and yellow, sometimes reddish or dark yellow, at knob.

Frons up to about twice as wide as anterior ocellus, rarely narrower than the latter; *ors* absent; A_3 usually less than twice as long as wide; arista distinctly pubescent even if the longest hairs are shorter than basal diameter of arista; genal setae in 2-3 rows; epistoma (in profile) sometimes protruded (forward) a little beyond (the vertical line from the tip of) parafrontal angle in certain species, yet never extremely standing back from (the line from tip of) the angle; occiput with some setulae in a row on upper plane.

Mesonotum with *pre-acr* closely approximated to each other (when they are present and paired); *pra* well developed, as long as or longer than anterior *ntpl*; *prpl* usually 2 in number; *stpl* 1 : 2, below the lower posterior an additional finer seta usually discernible; scutellum sparsely to rather densely haired ventrally though occasionally bare in certain species. Abdomen club-shaped; genital pouch with a sack-shaped or fingerstall-like process, which is membranous or chitinized, present on right side between 6th sternite and pregenital sclerite (Figs. 164-170).

Mid femur usually with 1 or a few strong *av* on median third and some strong *pv* on basal half to two-thirds; t_2 with *av* occasionally appearing in certain species, and usually or constantly present in some others; t_3 without apical *pv*. Wings with costa setulose even if sparsely on ventral side close to lower row of spinules; posterior cross-vein hardly to a little sinuate.

The species treated here and their distributions are as follows: -

1. *Phorbia morula* Ackland. Nepal.
2. *P. morulina* sp. nov. Nepal.
3. *P. subsymmetrica* Fan. Nepal and Tibet. New to Nepal.
4. *P. minuta* sp. nov. Nepal.
5. *P. nepalensis* Suwa. Nepal.
6. *P. omeishanensis* Fan. Nepal and China (Sichuan). New to Nepal.
7. *P. tysoni* Ackland. Nepal and Tibet.
8. *P. lobatoides* Suwa. Nepal.
9. *P. pilostyla* Suwa. Nepal and Tibet.
10. *P. pilostyloides* sp. nov. Nepal.
11. *P. pilicerca* Suwa. Nepal.
12. *P. seticauda* sp. nov. Nepal.
13. *P. nishidai* sp. nov. Nepal.

Distribution of some characters in the Nepalese species is summarized in Table 1. For comparison two non-Nepalese species, *Phorbia sho* Suwa, 1991, from Japan and *Phorbia penicillaris* (Stein, 1916) from Europe, are included in the table. As in the case of the non-Nepalese species of *Phorbia*, the Nepalese species are separated into 2 groups: - one is characterized by the hook-shaped (twisted) acrophallus, and the other by the sting-like one. According to Michelsen (1987) "The phallic structure, in particular the acrophallus with its asymmetrical free apex twisted to the right, appears identical in the ground plan of both groups (*Heterostylodes* and

Table 1. Distribution of some characters in the Nepalese species of *Phorbia*

| Characters | Species | | | | | | | | | | | | | |
|--|-----------------|-----------------|----------------------|---------------------|-------------------|---------------------|----------------|-------------------|------------------|----------------------|--------------------|------------------|-----------------|------------------------------|
| | morula group | | | | | | pilicera group | | | | | | | |
| | morula subgroup | | | lobatoides subgroup | | | sho (Japan) | | | pilicera group | | | | |
| | <i>morula</i> | <i>morulina</i> | <i>subsymmetrica</i> | <i>minuta</i> | <i>nepalensis</i> | <i>omeshanensis</i> | <i>tysoni</i> | <i>lobatoides</i> | <i>pilostyla</i> | <i>pilostyloides</i> | <i>sho</i> (Japan) | <i>seticanda</i> | <i>nishidai</i> | <i>penicillaris</i> (Europe) |
| 1. Parafrontals with <i>ors</i> absent (+), or present (-). | + | + | + | + | + | + | + | + | + | + | - | + | + | - |
| 2. Genital pouch with a hollow process on right side (+), or without such a process (-). | + | + | + | + | + | + | + | + | + | + | - | + | + | - |
| 3. Distiphallus with acrophallus sting-like (+), or hook-shaped (-). | - | - | - | - | - | - | - | - | - | - | - | + | + | + |
| 4. Cercal plate with a dense tuft of setae (+), or without such a tuft (-). | - | - | - | - | - | - | - | - | - | - | - | + | + | + |
| 5. Cercal plate with ramified setae (+), or with no ramified setae (-). | - | - | - | - | - | - | - | - | - | - | - | + | + | - |
| 6. Fifth sternite with processes rod-like (+), blade-like ('+'), or half-depressed (-). | +' | +' | +' | +' | +' | +' | +' | +' | +' | +' | - | + | + | + |
| 7. Fifth sternite with processes edged on inner margin (+), or not (-). | + | + | + | + | + | + | + | + | + | + | - | - | - | - |
| 8. Sixth tergite fused with pregenital sclerite at least on right half (+), or only near right 6th spiracle (-). | + | + | + | + | + | + | + | + | + | + | - | - | - | - |
| 9. Hypandrium with basal covering chitinized (+), or membranous (-). | + | + | + | + | + | + | + | + | + | + | - | - | - | - |
| 10. Surstyli with a fringe or patch of fine hairs ventrally (+), or without such hairs (-). | + | + | + | + | + | + | + | + | + | + | - | - | - | - |
| 11. Sixth sternite with a pair of distinct protuberances (+), or without such protuberances (-). | + | + | + | + | + | + | + | - | - | - | - | - | - | - |
| 12. Cercal plate asymmetrical (+), or symmetrical (-). | + | + | + | + | + | + | + | - | - | - | - | - | - | - |
| 13. Right pregonite much (+) or slightly (\pm) larger than the left, or as large as the latter (-). | + | + | + | + | + | + | + | \pm | - | - | - | - | - | - |
| 14. Surstyli distinctly (+) or slightly (\pm) asymmetrical, or symmetrical (-). | - | - | - | + | \pm | \pm | + | - | + | \pm | - | - | - | - |
| 15. Cercal plate broadly grooved medially (+), or not grooved (-). | - | - | - | - | - | - | - | + | + | + | - | - | - | - |
| 16. Surstyli connected with each other through chitinous expansions at base inside (+), or without such expansions and widely separated (-). | - | - | - | - | - | - | - | + | + | + | - | - | - | - |

Phorbia + *Boreophorbia*).” Therefore it is uncertain whether the group formed by the hook-shaped acrophallus alone is monophyletic or paraphyletic. Apart from this, the Nepalese species of this group are characterized by the hypandrium with a chitinous covering at base (Figs. 32-33), which is quite unique not only among the species of *Phorbia* but also among the whole family of Anthomyiidae. It is, therefore, very probable that they form a monophyletic group, here called the *morula* group. On the other hand, the sting-like acrophallus is considered as apomorphic, and the group with this character, consisting of both Nepalese and non-Nepalese species, may be monophyletic. The Nepalese species of this group are characterized and derivative in having a tuft of ramified setae on the cercal plate, so that the *pilicerca* group is here recognized for them. All the non-Nepalese species with a sting-like acrophallus are clearly different from the *pilicerca* group in some features.

1. *Morula* group. In addition to the chitinous covering on the hypandrium, the presence of a fringe or patch of fine ventral hairs on the surstyli is constitutive for the group. The 5th sternite with half-depressed processes is commonly seen in *Phorbia* and *Heterostyloides*, and the sternite with subapically notched processes is widely seen in *Phorbia* irrespective of the acrophallic state. Both these characters may take part in the ground plan of *Phorbia*, though variously modified subsequently. In the *morula* group the 5th sternite has the processes generally well depressed and edged on inner margin. The sternite of this type is derivative in the genus, and may be constitutive for the *morula* group. The 6th tergite is variously united with the pregenital sclerite in *Phorbia*, closely adjoining the sclerite if little fused. A little fused condition is primitive in *Phorbia*. Largely fused conditions are seen in all the members of the *morula* group, but are also found in some non-Nepalese species of *Phorbia* with a hook-shaped acrophallus, e.g. *P. molinialis* (Karl, 1917), *P. longipilis* (Pandellé, 1990), and *P. asiatica* Hsue, 1981, which, however, are not particularly close to the Nepalese species. Fused conditions may have developed in the *morula* group independently of other species. This group is further divided into 2 subgroups: the *morula* subgroup and the *lobatooides* subgroup.

Morula subgroup. The 6th sternite with a pair of distinct protuberances (Figs. 172-178) and the asymmetrical cercal plate are characteristic of this subgroup. The pregonites are remarkably asymmetrical in all the members of this subgroup. The surstyli are variable, being symmetrical to greatly asymmetrical. The process on the right side of the genital pouch is chitinized and not tomentose. Here are included 7 species: *morula*, *morulina*, *subsymmetrica*, *minuta*, *nepalensis*, *omeishanensis*, and *tysoni*. Of them 3 species have also been found in Tibet or China (Sichuan). The Japanese *Phorbia asymmetrica* Suwa, 1974, belongs to this subgroup.

Lobatooides subgroup. The constitutive characters for this subgroup are the chitinous expansions connecting the bases of the surstyli (cf. Figs. 107-108) and the practically divided cercal plate with a broad median groove. The process on the right side of the genital pouch is membranous or chitinized, and more or less tomentose. The pregonites and the surstyli are asymmetrical in certain species. Three species are placed here: *lobatooides*, *pilostyla* and *pilosyloides*. *P. pilostyla* is also known from Tibet. The Chinese *Phorbia gemmullata* Feng et al., 1984, from Sichuan, belongs to this subgroup. The North American *Phorbia lobata* (Huckett, 1929) may also be placed here. Further, *Phorbia ponti* Hennig, 1969, known from Germany, *Phorbia personi* Hennig, 1976, from Siberia and China (Xinjiang), and

Phorbia hypandrium Li et Deng, 1981, from China (Sichuan), might belong to this subgroup, but I am still uncertain about their exact positions.

2. *Pilicerca* group. In addition to the cercal plate with a tuft of ramified setae, the much narrowed pregonites are characteristic of this group. The process on the right side of the genital pouch is membranous and tomentose. Among the non-Nepalese species of *Phorbia* with a sting-like acrophallus, *P. penicillaris* (Stein, 1916) and its allies are similar to this group in the 5th sternite with rod-like processes, the surstyli with a bladed distal part, and the cercal plate with a dense tuft of setae, but they are clearly different from the group in other features. The *pilicerca* group are represented by 3 species: *pilicerca*, *seticauda* and *nishidai*, none of them having been recorded outside Nepal.

As stated above, the *morula* and the *pilicerca* groups are distinct from each other, and may have respective relatives outside Nepal.

The parafrontals without *ors* and the ventrally haired scutellum are commonly found in the two groups, and the genital pouch with a hollow process is seen exclusively in them. The agreements in these characters may be interpreted as homoplastic.

The distinctness of the groups and the concentration of the species in Nepal suggest that the groups originated in the Himalayan region and that the *morula* group expanded north to Eurasia and even North America. A similar evolutionary scenario was presented for the *allicola* group of *Pegomya* (Suwa, 1984).

KEY TO THE SPECIES OF PHORBIA KNOWN FROM NEPAL (MALES)

1. Cercal plate with a dense tuft of ramified setae; 5th sternite with processes rod-like; mesonotum without *pre-acr*; t_2 with *av* present, usually 2 in number; distiphallus with a sting-like acrophallus; hypandrium without a chitinous covering at base; 6th tergite fused with pregenital sclerite only near right 6th spiracle. *pilicerca* group : 2
- Cercal plate without a tuft of setae, and with no setae ramified; 5th sternite with processes blade-like; mesonotum usually with *pre-acr*; t_2 with *av* present or absent, when present usually 1 in number; distiphallus with a hook-shaped acrophallus; hypandrium with a chitinous covering at base; 6th tergite fused with pregenital sclerite at least on right half. *morula* group : 4
2. Mesopleura with a single *pstg*; genital pouch with a membranous fingerstall-like process at left side (Fig. 171) in addition to right process; surstyli with a distinct notch discriminating distal blade on ventral side (Fig. 151). 13. *nishidai* sp. nov.
- Mesopleura with 2 *pstg*; genital pouch without any process apart from right one; surstyli without a notch ventrally. 3
3. Fifth sternite with processes not constricted near apex (Figs. 130-131); cercal plate with tuft of setae covering more than distal half, the setae shorter than the plate itself (Figs. 132-133). 11. *pilicerca* Suwa
- Fifth sternite with processes constricted near apex (Figs. 138-139); cercal plate with tuft of setae covering less than distal half, most of the setae longer than the plate itself (Figs. 140, 142). 12. *seticauda* sp. nov.
4. Cercal plate symmetrical, broadly grooved medially and practically divided into 2 pads; surstyli each with a chitinous expansion at base inside and connected with each other through the expansions; 6th sternite with no protuberances medially; pregonites symmetrical, at most the right one only a little larger. *lobatoides* subgroup : 5
- Cercal plate asymmetrical, a little to much developed on left side, and not grooved medially; surstyli without a chitinous expansion at base inside and widely separated; 6th sternite with a pair of small protuberances medially; pregonites greatly asymmetrical, the right one

- always much larger. *morula* subgroup: 7
5. Mid tibia with no *av*; surstyli with a lobe developed near middle inside, and with a small patch of short hairs near the lobe ventrally (Figs. 106-107). 8. *lobatoides* Suwa
- Mid tibia with or without 1 *av*; surstyli without a lobe, and with a dense fringe of longer hairs ventrally. 6
6. Terminalia as in Figs. 112-119; cercal plate long setose; surstyli distinctly asymmetrical, each expanded near middle dorsally in profile. 9. *pilostyla* Suwa
- Terminalia as in Figs. 120-129; cercal plate shortly setose; surstyli almost symmetrical, and hardly expanded dorsally in profile. 10. *pilostyloides* sp. nov.
7. Cercal plate greatly asymmetrical, much more protruded caudad on left side, and only with a slight swelling or a short lobe on the right apically. 8
- Cercal plate less greatly asymmetrical, well protruded caudad on both sides to produce a pair of developed distal lobes, which are not much different in length. 11
8. Cercal plate with left distal lobe weakly developed and much shorter than half length of the plate (Figs. 61-62). 4. *minuta* sp. nov.
- Cercal plate with left distal lobe very well developed and as long as or longer than half length of the plate. 9
9. Fifth sternite with processes longer than twice the median length of basal plate and nearly parallel-sided in profile (Figs. 91-92). 7. *tysoni* Ackland
- Fifth sternite with processes shorter than twice the median length of basal plate and not parallel-sided in profile. 10
10. Epandrium acute at anterodorsal corner in profile (Fig. 76); 5th sternite with processes gradually narrowed near apex (Fig. 74). 5. *nepalensis* Suwa
- Epandrium obtuse at anterodorsal corner in profile (Fig. 85); 5th sternite with processes abruptly narrowed near apex (Fig. 83). 6. *omeishanensis* Fan
11. Terminalia as in Figs. 1-26; 5th sternite with processes usually not notched subapically on inner margin; cercal plate, inclusive of distal lobes, as long as or only a little longer than wide. 1. *morula* Ackland
- Fifth sternite with processes usually a little notched subapically on inner margin; cercal plate, inclusive of distal lobes, much longer than wide. 12
12. Terminalia as in Figs. 27-46; cercal plate in profile with distal lobes much broadened; surstyli robust and weakly curved ventrad. 2. *morulina* sp. nov.
- Terminalia as in Figs. 47-58; cercal plate in profile with distal lobes narrowly maintained; surstyli narrow and strongly curved ventrad. 3. *subsymmetrica* Fan

DESCRIPTIONS OF THE SPECIES

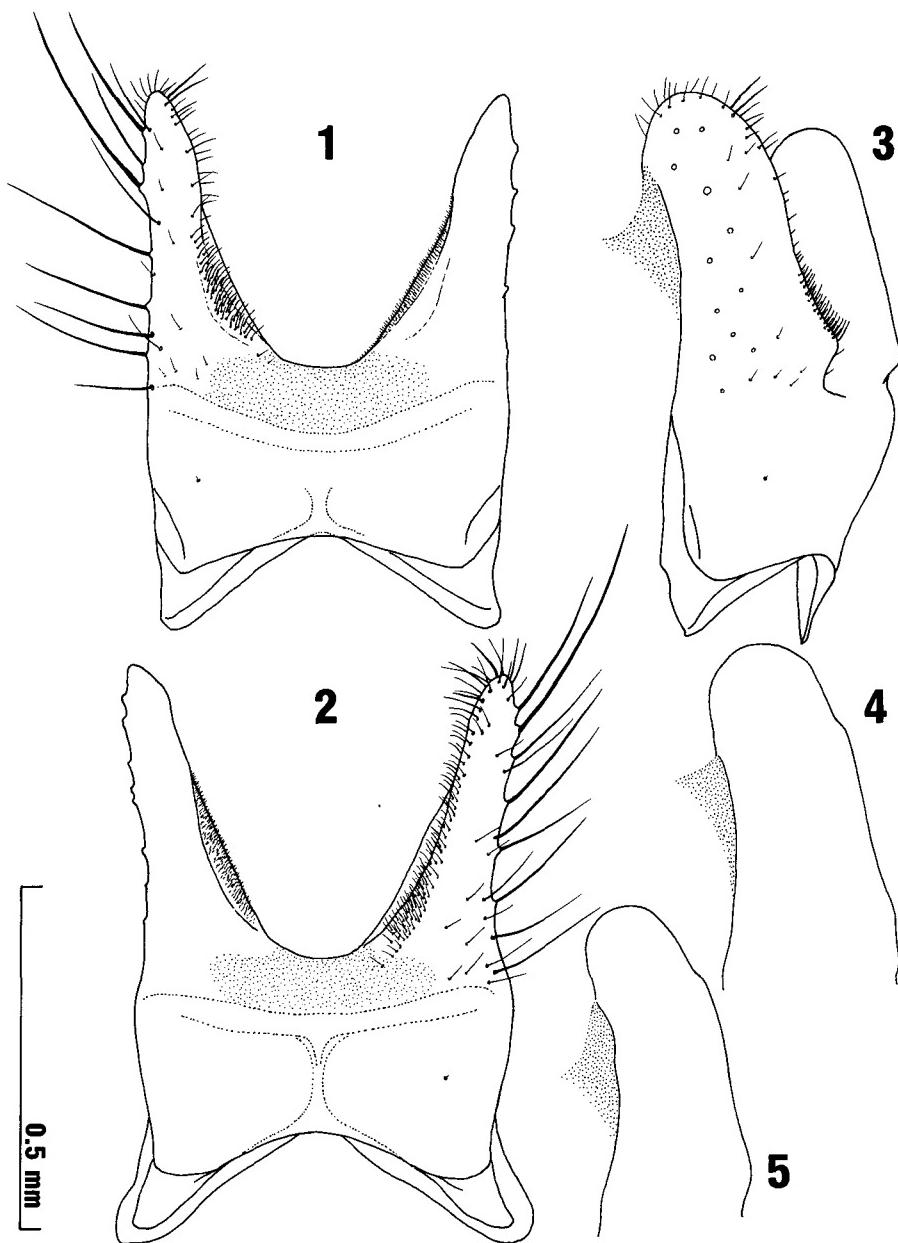
1. *Phorbia morula* Ackland

(Figs. 1-26, 158, 164-165, 172)

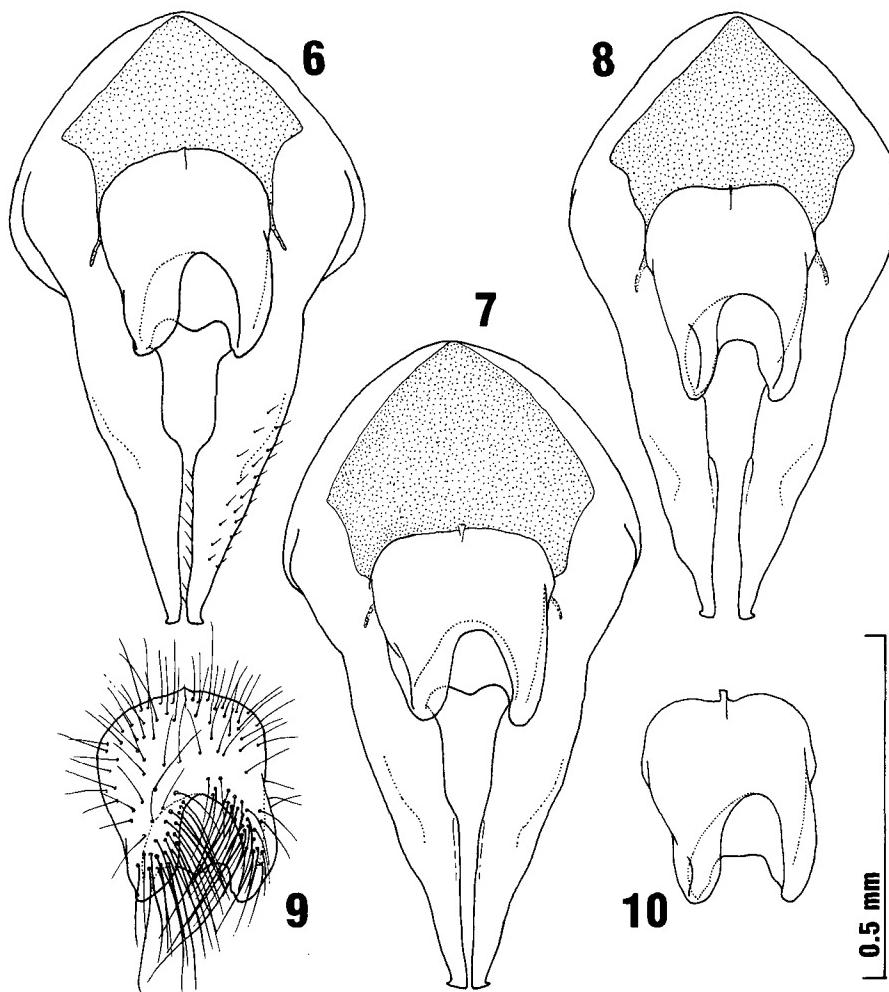
Phorbia morula Ackland, 1967: 130; Suwa, 1977: 36.

Material examined*. W. Nepal: Baitadi, Tinkar Khola, 13,000 ft., 1♂ (holotype of *morula*), 3. vii. 1953 (J.B. Tyson). Dhaulagiri: Ulleri, ca. 2,000 m, 5♂, 11. v. 1968 (T. Kumata). Bagmati: Sing Gompa (=Syng Gomba) - Gosainkund, 3,300-3,700 m, 23♂, & 3,700-4,300 m, 61♂, 24. v. 1988; Gosainkund, 4,300 m, 1♂, 4. vi. 1968 (T. Kumata); Ghopte - Gosainkund, 3,500-4,000 m, 28♂, 25. v. 1988; Ghopte - Thare Pati, 3,400-3,600 m, Gosainkund Lekh, 54♂, 26. v. 1988; Thare Pati, Helambu, 4♂, 6. vi. 1968 (T. Kumata); Magen Gotha - Thare Pati, 3,200-3,600

* The specimens were collected by myself unless otherwise stated; MT=Malaise Trap; KU=Kyushu University Party.



Figs. 1-5. *Phorbia morula* Ackland, ♂. 1-2, 5th sternite, ventral view; 3, ditto, ventrolateral view; 4-5, process of 5th sternite, ventrolateral view. Sing Gompa - Gosainkund (Figs. 1, 3; 2), Magen Gotha - Thare Pati (4), and Baitadi (5, holotype).

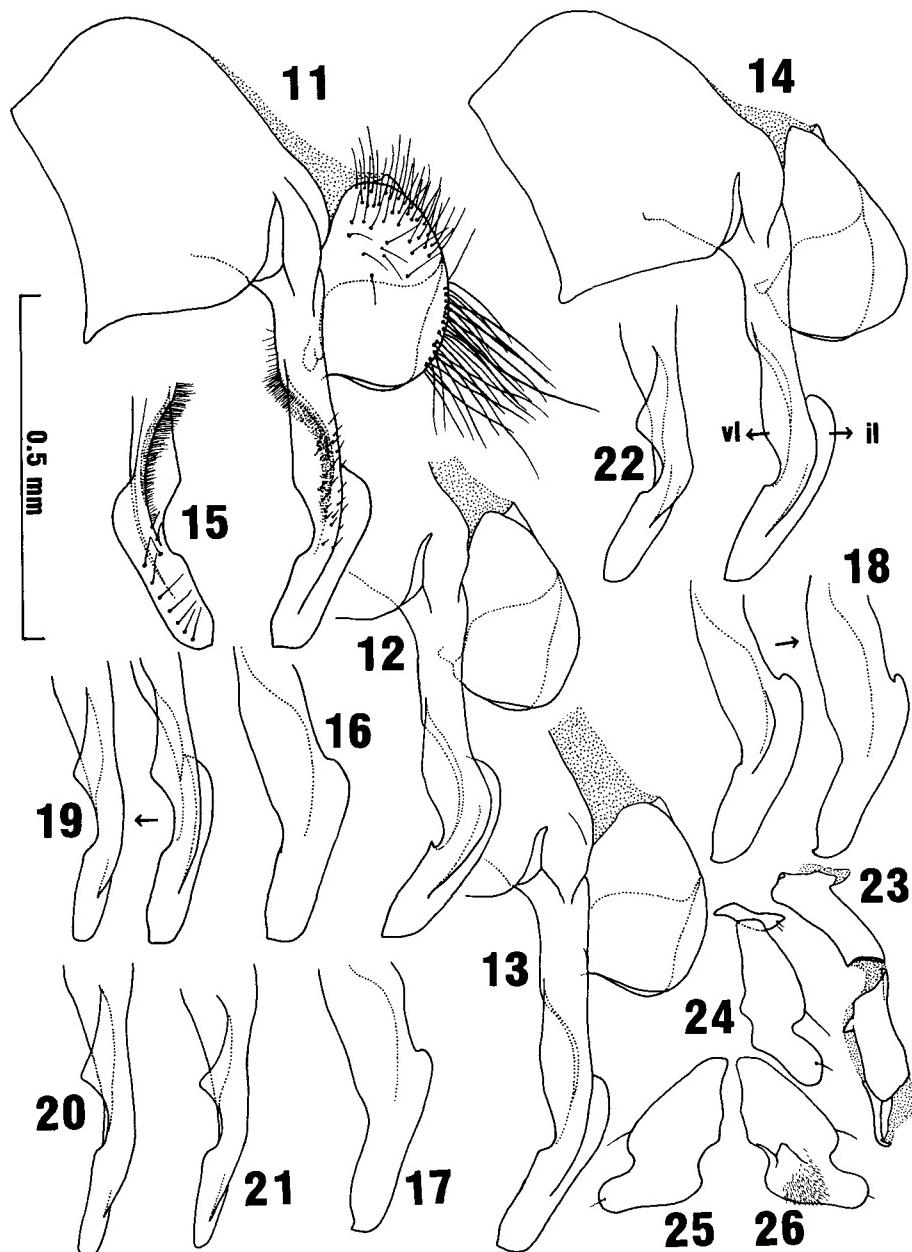


Figs. 6-10. *Phorbia morula* Ackland, ♂. 6-8, hypopygium, dorsal view; 9-10, cercal plate, dorsal view. Sing Gompa - Gosainkund (6, 9; 7), Baitadi (8, holotype), and Magen Gotha - Thare Pati (10).

m, 28♂, 27. v. 1988. E. Nepal : Thudam, 3,500 m, 2♂, 20-24. vi. 1972 (H. Shima & Y. Nishida), 6♂, 21. vi-8. vii. 1972 (MT, KU); Thudam - Tanga La, 3,500-4,700 m, 1♂, 5.vii. 1972 (H. Shima); Tanga La, 4,000-4,600 m, 1♂, 7.vii. 1972 (J. Emoto). Some specimens in EDAN, and some others in BM.

♂. Wing-length 3-4.1 mm. Pollinosity brownish grey, sometimes paler, yet rarely whitish or silvery grey even on orbits. Halteres usually a little darkened at knob.

Frons wider than anterior ocellus, usually 1.5-2 times as wide as the latter; interfrontalia as wide as or slightly wider, rarely narrower, than anterior ocellus, with *if* distinct or often reduced to disappearance; 4-6 *ori*; *A₃* 1.5-1.8 times as long



Figs. 11-26. *Phorbia morula* Ackland, ♂. 11-14, hypopygium, lateral view, il, inside lobe, vl, ventrolateral lobe; 15, left surstylius, inside view; 16-18, ditto, dorsolateral view; 19-22, ditto, ventrolateral view; 23, basiphallus and distiphallus; 24, left pregonite and postgonite; 25, right pregonite; 26, ditto, inside view. Sing Gompa - Gosainkund (11, 15-16, 19; 13, 20), Magen Gotha - Thare Pati (12), Baitadi (14, 18, 22, holotype), Ghopte - Thare Pati (17), Thudam (21), and Tanga La (23-26).

as wide ; arista with the longest hairs as long as or slightly shorter than basal diameter of arista ; orbits (at parafrontal angle) as wide as to distinctly wider than A₃ ; cheeks a little higher than orbital width (at parafrontal angle) ; epistoma protruded as far as, or a little beyond, parafrontal angle.

Mesonotum with 2-5 rather fine *pre-acr* in 2 rows ; 2nd *ph* usually a little stronger than adjacent setulae ; mesopleura with no, at most 1, associated setula around *pstg* ; scutellum usually rather densely haired on ventral side, at least with some hairs discernible.

Abdomen with terminalia shaped as in the figures ; 5th sternite with processes at most very faintly notched on inner margin near apex, and usually not so at all ; cercal plate, inclusive of distal lobes, as long as or only a little longer than wide ; the lobes nearly same in length, yet the right one less expanded dorsad and usually a little concave on dorsal line in profile ; surstyli symmetrical to each other and distinctly bent ventrad near apical third, in profile blunt and apiculate distally, or sometimes knife-shaped, and with ventrolateral lobe pointed medially ; both pregonites pilose near ventral margin inside, though often bare.

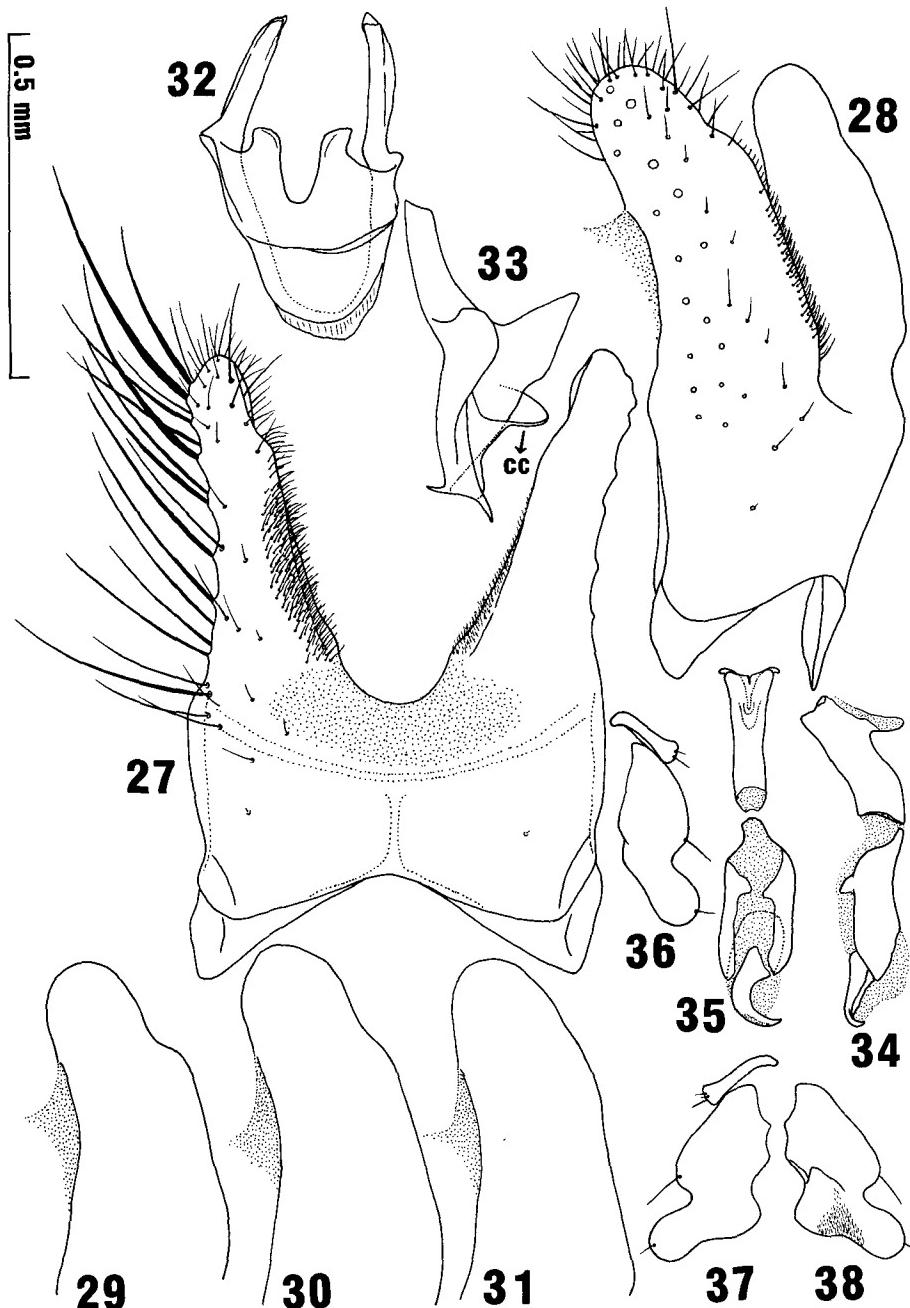
Mid femur with a few or some rather distinct *av* on basal third and usually with 1 or a few strong *av* on median third, and with some (4-8) strong *pv* on basal half to two-thirds, sometimes some rather developed *pv*, inclusive of 1 or 2 ordinary *pv* near apex, being discernible on apical third and forming a complete row together with proximal *pv* ; f₃ with a row of 6-8 strong *av*, and on basal half to two-thirds with some *pv*, which are usually divided into 1 weak *pv* near base and a few or some stronger *pv* on median third, the longest *pv*, without regard to prebasal one(s), at most as long as f₃-height ; t₁ with 1-2 *pv* and no or rarely 1 *ad* ; t₂ with 1 *ad*, 2 or sometimes 1 *pd* and 2 *pv*, and often with 1 *av* ; t₃ with 2-4 (usually 3) *av*, 2-3 or sometimes 4 *ad*, 4-7 *pd* (not uniform in length, 2-4 setae strong) and 0-3 (usually 1-2) *pv*. Wings with costal thorns as long as or a little shorter than *h*-vein (measured on outer margin), rarely longer than the latter.

Remarks. The holotype of *morula* is rather unusual in some features of the terminalia among the specimens at hand identified with the species : cercal plate on dorsal view with posteroventral margin deeply emarginated and not convex medially (Fig. 8), and in profile much swollen caudad, with right distal lobe not concave on dorsal line (Fig. 14) ; surstyli not blunt apically in profile, and with inside lobe distinctly notched at anterior joint (Fig. 18). Nevertheless, these features are variable to some extent (e.g., Figs. 10, 12 and 17) and the holotype shows extreme characters in some features. The chitinous covering at the base of the hypandrium is illustrated in the original description (Fig. 65, Ackland, 1967).

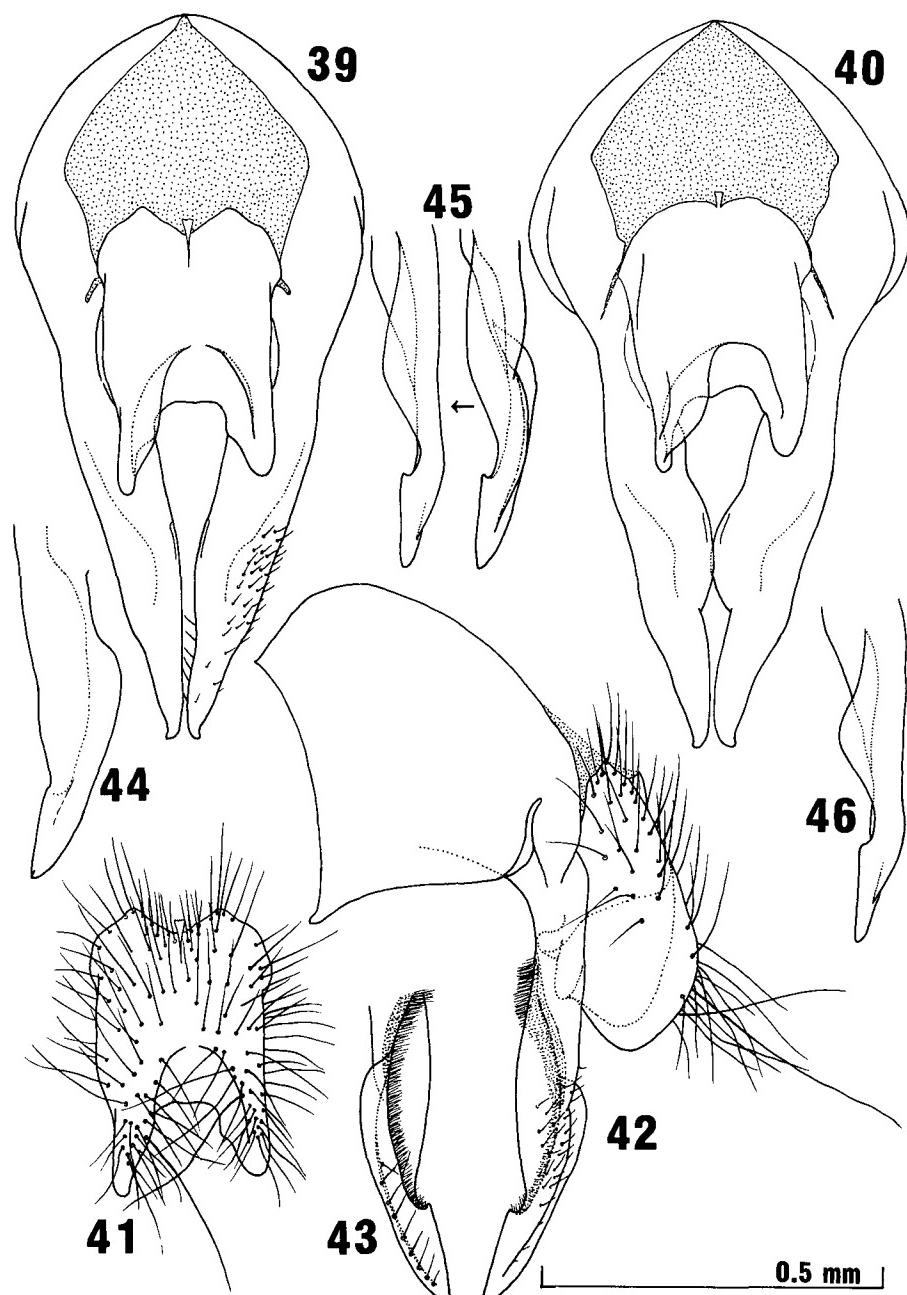
2. *Phobia morulina* sp. nov.

(Figs. 27-46, 159, 173-174)

Type material. Bagmati : Ghora Tabela - Langtang, 3,000-3,400 m, Langtang Valley, 16♂ (one the holotype), 15. v. 1988, 20♂, 19. v. 1988, 1♂, 12. ix. 1983, and 1♂, 19. ix. 1983 ; "Lama Hotel" - Ghora Tabela, 2,500-3,000 m, 28♂, 21. v. 1988, and 1♂, 19. ix. 1983 ; Ghora Tabela, 3,000 m, 99♂, 20.v.1988 ; Langtang - Kyanjing, 3,400-3,800 m, 17♂, 16-18. v. 1988 ; Dhunche - Syabru, 1,800-2,300 m, Gosainkund Lekh, 1♂, 13. v. 1988 ; Syabru - Sing Gompa, 2,700-3,000 m, 1♂, 21. ix. 1983, and



Figs. 27-38. *Phorbia morulina* sp. nov., ♂. 27, 5th sternite, ventral view; 28, ditto, ventrolateral view; 29-31, process of 5th sternite, ventrolateral view; 32, hypandrium, ventral view; 33, ditto, lateral view, cc, chitinous covering; 34, basiphallus and distiphallus; 35, ditto, ventral view; 36, left pregonite and postgonite; 37, right pregonite and postgonite; 38, right pregonite, inside view. Holotype from Ghora Tabela - Langtang (27-28, 34-38), and paratypes from Ghora Tabela (29; 31), Sing Gompa - Gosainkund (30), and Langtang - Kyanjing (32-33).



Figs. 39-46. *Phorbia morulina* sp. nov., ♂. 39-40, hypopygium, dorsal view, inside lobes inclined in Fig. 40; 41, cercal plate; 42, hypopygium, lateral view; 43, left surstylos, inside view; 44, ditto, dorsolateral view; 45-46, ditto, ventrolateral view. Holotype from Ghora Tabela - Langtang (39, 41-45) and paratype from Syabru - Sing Gompa (40, 46).

3,000–3,300 m, 3♂, 23. v. 1988; Sing Gompa – Gosainkund, 3,300–3,700 m, 12♂, 24. v. 1988; Ghopte – Thare Pati, 3,400–3,600 m, Gosainkund Lekh, 5♂, 26.v. 1988; Dada Kharka – Ghopte, 3,300–3,600 m, 2♂, 26. ix. 1983; Magen Gotha – Thare Pati, 3,200–3,600 m, Helambu, 6♂, 27. v. 1988; Kutumsang – Magen Gotha, 2,500–3,000 m, 3♂, & 3,000–3,200 m, 5♂, 28. v. 1988; Kutumsang – Dada Kharka, 3,000–3,200 m, 1♂, 26. ix. 1983; Chiplin – Kutumsang, 2,000–2,500 m, 2♂, 29. v. 1988, and 2♂, 28. ix. 1983; Godawari – Pulchoki, 1,500–2,760 m, Kathmandu Valley, 1♂, 30. ix. 1990 (M. Iwasa). Some paratypes in EDAN, and some others in BM.

♂. Much resembling the preceding *morula*, yet larger in size on average and often paler in pollinosity. Wing-length 3.3–5 mm. Pollinosity brownish grey, often paler, and sometimes largely bluish grey with brownish pollinosity discernible on face (rather weakly), on interfrontalia, on mesonotum especially along rows of setae, on mesopleura along dorsal to posterior margin, and on abdomen medially. Halteres often slightly darkened at knob.

Frons a little wider than anterior ocellus, usually 1.2–1.6 times as wide as the latter; interfrontalia a little narrower than anterior ocellus, with *if* usually minute and often hardly discernible unless carefully examined; 4–7 *ori*; A_3 1.7–2.2 times as long as wide; orbits a little to much wider than A_3 , up to 1.8 times as wide as the latter; arista with the longest hairs as long as or a little longer than basal diameter of arista; epistoma rarely protruded beyond parafrontal angle.

Mesonotum with 0–4 *pre-acr*; 2nd *ph* fine or slightly stronger than adjacent setulae, sometimes completely lacking; scutellum rather densely haired ventrally.

Abdomen with terminalia as in the figures; 5th sternite with processes usually a little notched on inner margin near apex; cercal plate, inclusive of distal lobes, much longer than wide; the lobes different in length, left one a little longer and more expanded dorsad than the right; surstyli almost symmetrical and gently curved ventrad, in profile knife-shaped on apical part, and with ventrolateral lobe obtusely expanded medially; both pregonites with inside pilosity hardly to rather well developed.

Mid femur with 3–5 strong *pv*; f_3 with the longest *pv* as long as to distinctly longer than f_3 -height, rarely shorter than the latter; t_1 with no *ad* and 1 or sometimes 2 *pv*; t_2 sometimes with 1 *av*; t_3 with 2–5 *pd* and 1–3 *pv*. Wings with costal thorns well developed, sometimes a little, yet usually distinctly longer than *h*-vein.

Remarks. In most external features the present species is very similar to the foregoing *morula* and the succeeding *subsymmetrica*, and it is not easy to identify specimens unless their terminalia are examined. The well-developed costal thorns in *morulina* is useful in distinguishing the species from *morula*, yet often unhelpful in distinguishing it from *subsymmetrica*. The cercal plate with well-swollen profile and the surstyli with deeply concave ventral side are common to *morula* and *morulina*, but not to *subsymmetrica*.

3. *Phorbia subsymmetrica* Fan

(Figs. 47–58, 175)

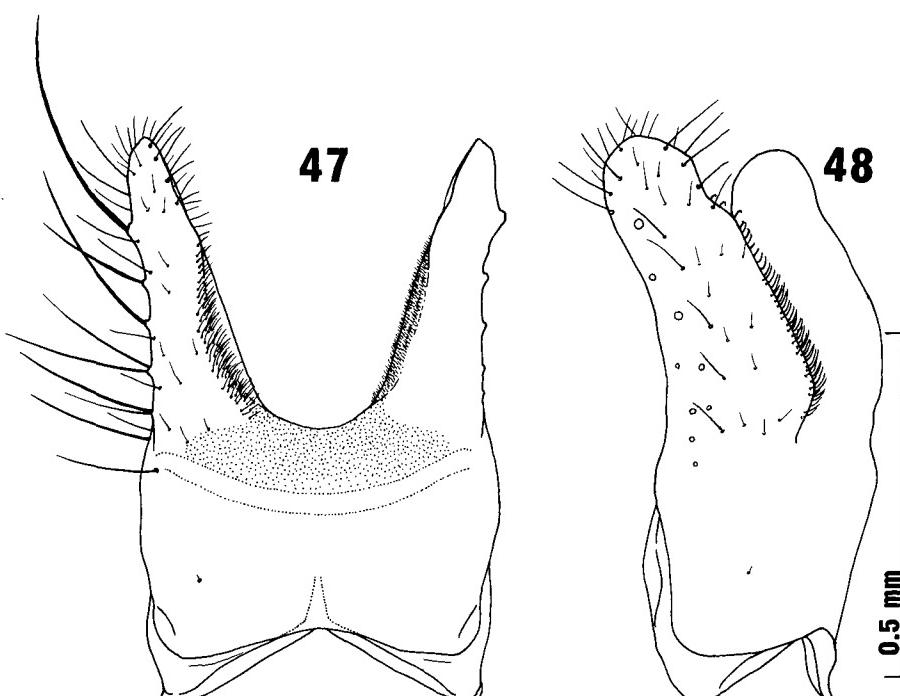
Phorbia subsymmetrica Fan, in Fan et al., 1982 : 234; Fan et al., 1988 : 140.

Material examined. Bagmati: “Lama Hotel” – Ghora Tabela, 2,500–3,000 m,

Langtang Valley, 3♂, 21. v. 1988; Ghora Tabela, 3,000 m, 3♂, 20. v. 1988; Ghora Tabela - Langtang, 3,000-3,400 m, 11♂, 19. v. 1988; Langtang - Kyanjing, 3,400-3,800 m, 1♂, 16-18. v. 1988; Sing Gompa - Gosainkund, 3,300-3,700 m, 4♂, 24. v. 1988; Ghopte - Thare Pati, 3,400-3,600 m, Gosainkund Lekh, 10♂, 26. v. 1988; Dada Kharka - Ghopte, 3,300-3,600 m, 1♂, 26. ix. 1983; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 39♂, 27. v. 1988; Kutumsang - Magen Gotha, 3,000-3,200 m, 5♂, 28. v. 1988; Mure, 2,500 m, near Charikot, 1♂, 7. viii. 1983. Janakpur: Shakpa - Chusa Kharka, 3,000-3,400 m, Rolwaling Valley, 4♂, 13. viii. 1983; Chusa Kharka, 3,400 m, 2♂, 14. viii. 1983; Beding, 3,300-3,700 m, Rolwaling Valley, 1♂, 16. viii. 1983; Dongo Kharka - Beding, 3,000-3,300 m, 1♂, 22-23. viii. 1983. E. Nepal: Thudam, 3,500 m, 2♂, 29-30. vi. 1972 (MT, KU), and 1♂, 20. vi. 1972 (H. Shima); NE of Thudam, 4,000 m, 1♂, 25. vi. 1972 (H. Shima); Thurukpa 2,000 m - Papun 2,100 m, 1♂, 14. vii. 1972 (Y. Nishida); Chouki 2,700 m - Basantapur 2,300 m, 1♂, 24. vii. 1972 (H. Makihara); Basantapur 2,300 m - Jirikinphri 1,850 m, 1♂, 12. v. 1972 (J. Emoto). Some specimens are preserved in EDAN, and some others in BM.

♂. Very similar to the preceding two species, *morula* and *morulina*. Wing-length 3.3-4.3 mm. Pollinosity brownish grey; orbits much paler in pollinosity, whitish grey and a little brownish, though brownish pollinose on upper narrowed area of parafrontalia. Halteres rarely darkened at knob.

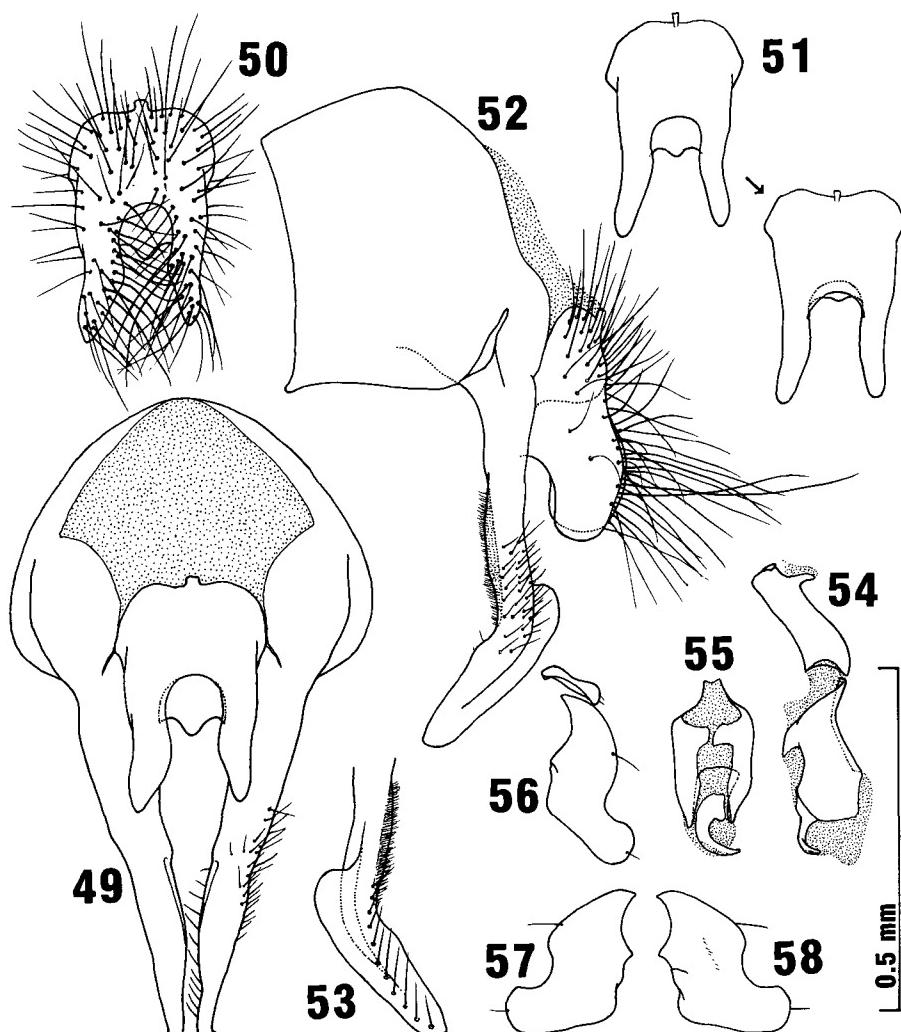
Frons as wide as or a little wider than anterior ocellus, rarely wider than 1.5 times of the latter width; interfrontalia usually about half as wide as anterior



Figs. 47-48. *Phorbia subsymmetrica* Fan, ♂. 47, 5th sternite, ventral view; 48, ditto, ventrolateral view. Ghora Tabela - Langtang.

ocellus, with *if* minute and hardly discernible unless carefully examined, or sometimes rather distinct ; 4-6 *ori* ; A_3 shorter than twice the width, usually 1.7-1.9 times as long as wide ; arista with the longest hairs as long as or a little longer than basal diameter of arista ; orbits as wide as or slightly wider than A_3 ; cheeks as high as or a little higher than orbital width ; epistoma rarely protruded beyond parafrontal angle.

Mesonotum with 2-4 (rarely 5) *pre-acr* ; 2nd *ph* fine ; scutellum sparsely to rather densely haired on ventral side.



Figs. 49-58. *Phorbia subsymmetrica* Fan, ♂. 49, hypopygium, dorsal view ; 50, cercal plate, dorsal view ; 51, ditto, dorsal to a little cephalic view ; 52, hypopygium, lateral view ; 53, left surstyli, inside view ; 54, basiphallus and distiphallus ; 55, distiphallus, ventral view ; 56, left pregonite and postgonite ; 57, right pregonite ; 58, ditto, inside view. Ghora Tabela - Langtang (49-50, 52-58) and Dongo Kharka - Beding (51).

Abdomen with terminalia as in the figures ; 5th sternite with processes a little notched on inner margin near apex ; cercal plate distinctly convex on posteroventral margin medially, and with distal lobes narrowly maintained both in dorsal and lateral views, the left lobe a little longer than the right ; surstyli symmetrical, distinctly bent ventrad near apical third, and not concave on haired area of ventral surface, with ventrolateral lobe little developed ; both pregonites with inside pilosity barely discernible or completely lacking.

Mid femur with 3-6 strong *pv* ; f_3 with the longest *pv* shorter to sometimes slightly longer than f_3 -height ; t_1 with no *ad* and 1 or sometimes 2 *pv* ; t_2 occasionally with 1 *av* ; t_3 with a few strong and usually a few weaker *pd* and with 0-3 *pv*. Wings with costal thorns shorter than, often as long as or a little longer than, *h*-vein.

Remarks. The cercal plate with well-prolonged distal lobes is often observable even in dried specimens and very useful in identification. The lobes figured in the original description of *subsymmetrica* are same in length, yet the left lobe is always a little longer than the right in the present material examined (16 specimens dissected). The surstyli are deeply concave on the haired area of the ventral surface in the other species of the *morula* subgroup, and more or less so in *pilostyla* of the *lobatoides* subgroup. The surstyli with little concave ventral surface in the present species may be derivative.

4. *Phorbia minuta* sp. nov.

(Figs. 59-72, 176)

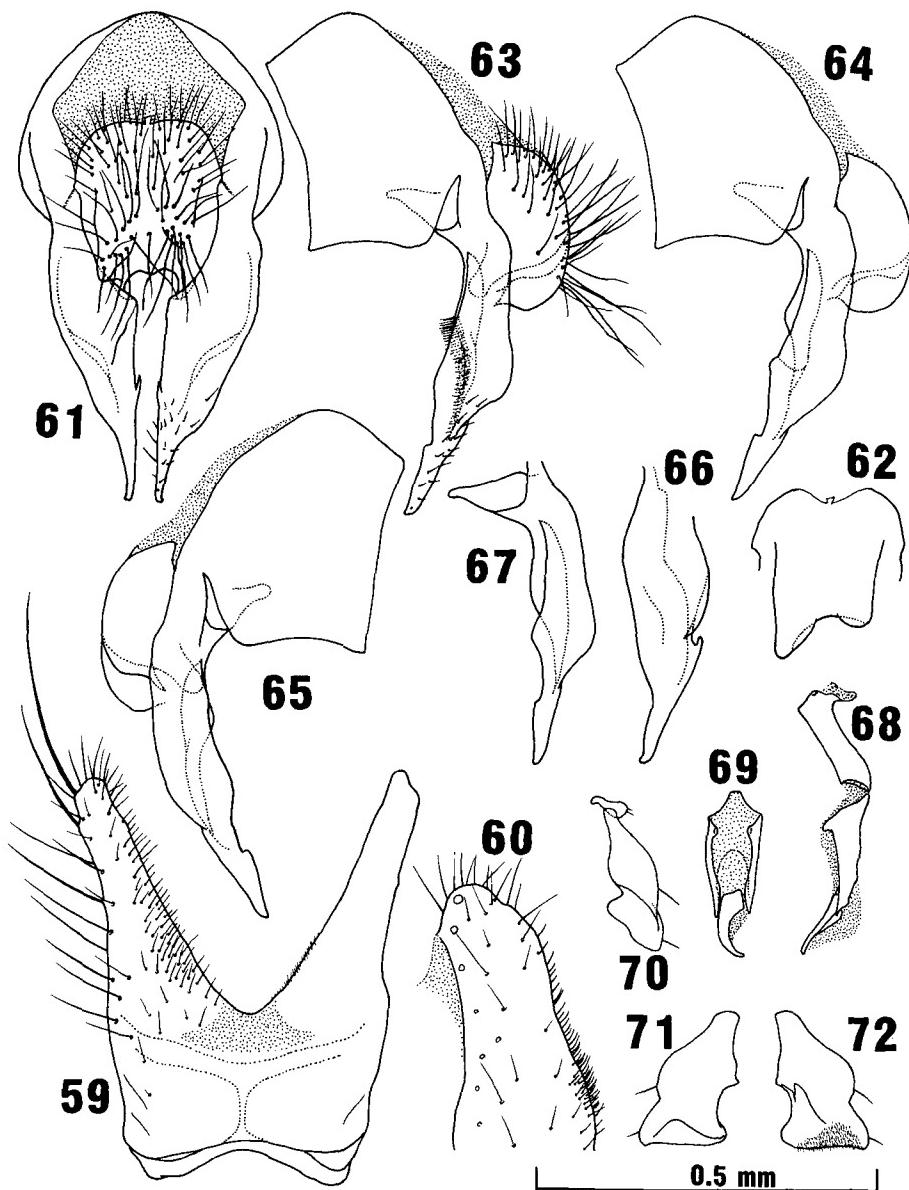
Type material. Janakpur : Dongo Kharka - Beding, 3,000-3,300 m, Rolwaling Valley, 3♂ (one the holotype), 22-23. viii. 1983 ; Beding, 3,300-3,700 m, 2♂, 16. viii. 1983. Bagmati : Ghora Tabela - Langtang, 3,000-3,400 m, 1♂, 19. v. 1988 ; Langtang - Kyanjing, 3,400-3,800 m, 2♂, 16-18. v. 1988 ; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 6♂, 27. v. 1988. Two paratypes from Magen Gotha - Thare Pati are deposited in EDAN.

♂. Wing-length 2.9-3.8 mm. Pollinosity brownish grey ; orbits not whitish or silvery grey in pollinosity.

Frons as wide as to distinctly wider than anterior ocellus, usually about 1.5 times as wide as the latter ; interfrontalia as wide as or narrower than anterior ocellus, with a pair of rather distinct to strong *if* (often unpaired) ; 3-5 *ori* ; A_3 1.5-1.8 times as long as wide ; arista with the longest hairs slightly shorter to slightly longer than basal diameter of arista ; orbits as wide as or slightly narrower, rarely wider, than A_3 ; cheeks usually a little higher than orbital width ; epistoma protruded as far as parafrontal angle, or situated a little behind the latter.

Mesonotum with 2-3, or sometimes 4, *pre-acr* ; 2nd *ph* fine, sometimes lacking ; scutellum at most with some (6 in the present material) hairs discernible on ventral surface, occasionally bare.

Abdomen with terminalia as in the figures ; 5th sternite with processes rather sparsely setulose along inner margin and not notched near apex ; outer marginal setae not strong except for a few ones near apex ; cercal plate distinctly protruded caudad on left side, yet only a little on the right ; surstyli rather distinctly asymmetrical, with inside lobe reduced to a small projection ; pregonites with inside pilosity discernible though sparse on the left one.



Figs. 59-72. *Phorbia minuta* sp. nov., ♂. 59, 5th sternite, ventral view; 60, process of 5th sternite, ventrolateral view; 61, hypopygium, dorsal view; 62, cercal plate, slightly cephalic view; 63-64, hypopygium, left lateral view; 65, ditto, right lateral view; 66, left surstyli, dorsolateral view; 67, ditto, ventrolateral view; 68, basiphallus and distiphallus; 69, distiphallus, ventral view; 70, left pregonite and postgonite; 71, right pregonite; 72, ditto, inside view. Paratypes from Magen Gotha - Thare Pati (59-63, 65-72) and Ghora Tabela - Langtang (64).

Mid femur near middle usually with 1 or a few strong *av*, on basal third to half with some slightly developed *av*, on apical third to half sometimes with some slightly developed *av*, and on basal half to two-thirds with some (3-5) strong *pv*; *f₃* with a row of 6-10 (sometimes 4-5) strong or rather strong *av*, and with a few weak *pv* near base and 1 or a few rather strong *pv* on median third, the longest *pv* being variable in length, distinctly shorter to distinctly longer than *f₃*-height; *t₁* with 1 or sometimes 2 *pv* and no *ad*; *t₂* with 1 *av*, 1 *ad*, 1-3 (usually 2) *pd* and 1-3 (usually 2) *pv*; *t₃* with 2-3 (sometimes 4-5) *av*, 2 strong and usually 1 or a few weaker *ad*, 2-3 strong and usually a few weaker *pd* and 0-4 (usually 1) *pv*. Wings with costal thorns rather small, as long as or a little shorter than *h*-vein (only a little longer than the vein in 1 specimen).

Remarks. This species is peculiar in the *morula* subgroup in having the cercal plate less protruded caudad, the surstyli comparatively broad in dorsal aspect and the 5th sternite with fewer strong outer marginal setae. The presence of 1 *av* on *t₂* is stable and recognized in all the material examined (14 specimens).

5. *Phorbia nepalensis* Suwa

(Figs. 73-81, 161-162, 177-178)

Phorbia nepalensis Suwa, 1977: 38.

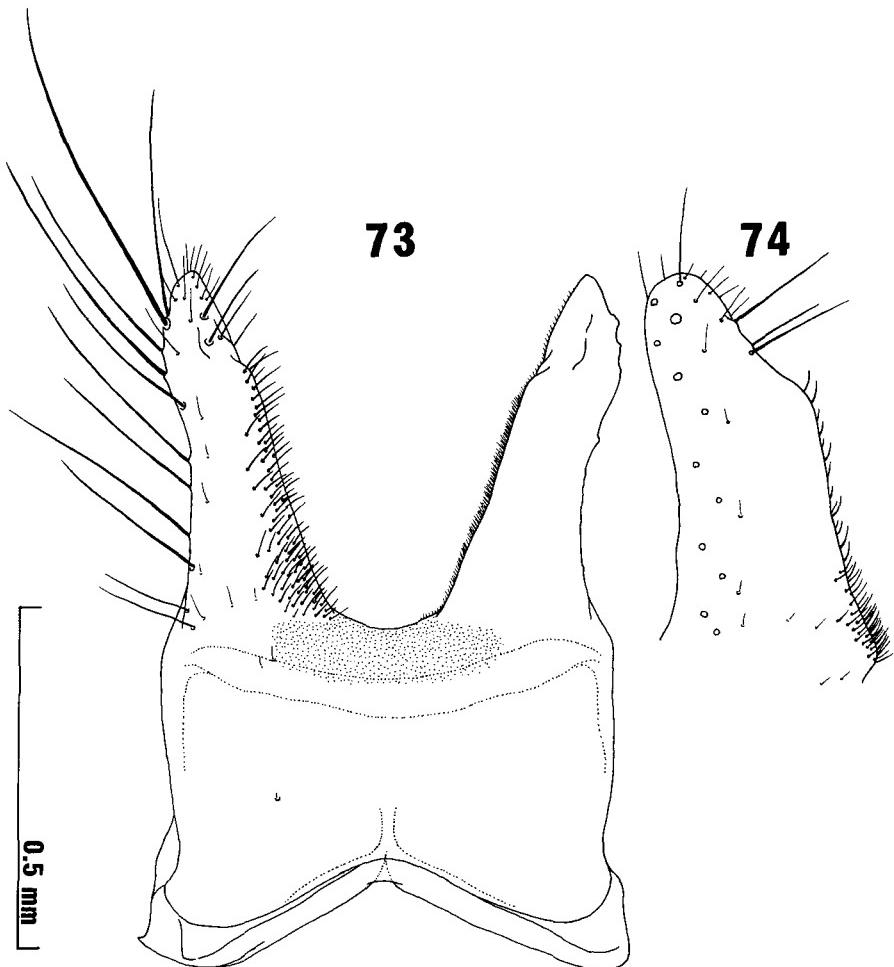
Material examined. Dhaulagiri: Ulleri, ca. 2,000 m, 2♂ (the type material of *nepalensis*), 11. v. 1968 (T. Kumata). Bagmati: Sing Gompa - Gosainkund, 3,300-3,700 m, 3♂, 24. v. 1988; Ghopte - Thare Pati, 3,400-3,600 m, Gosainkund Lekh, 9♂, 26. v. 1988; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 30♂, 27. v. 1988; Kutumsang - Magen Gotha, 3,000-3,200 m, 2♂, 28. v. 1988. E. Nepal: Thudam, 3,500 m, 1♂, 22. vi. 1972 (MT, KU). Some specimens in EDAN, and some others in BM.

♂. Wing-length 3.4-4.6 mm. Pollinosity pale brownish grey to brownish grey, in paler specimens mesonotum with brownish pollinose vittae discernible along rows of setae; orbits mainly whitish grey pollinose, faintly to rather distinctly tinged with brown; 5th sternite with processes strongly shining and polished along inner margin especially near subapical angle. Halteres rarely darkened at knob.

Frons as wide as or a little wider than anterior ocellus; interfrontalia narrower than anterior ocellus, with *if* vestigial or completely lacking, rarely developed; 5-7 *ori*; *A₃* 1.5-1.8 times as long as wide; arista with the longest hairs as long as or a little shorter than basal diameter of arista; orbits as wide as or a little wider than *A₃*; cheeks as high as to distinctly higher than orbital width; epistoma protruded as far as parafrontal angle, or situated a little behind the latter.

Mesonotum with 2-6 (usually 4-5) *pre-acr*; 2nd *ph* a little stronger than adjacent setulae, rarely well developed; scutellum rather sparsely haired ventrally, sometimes with only a few hairs, yet rarely bare.

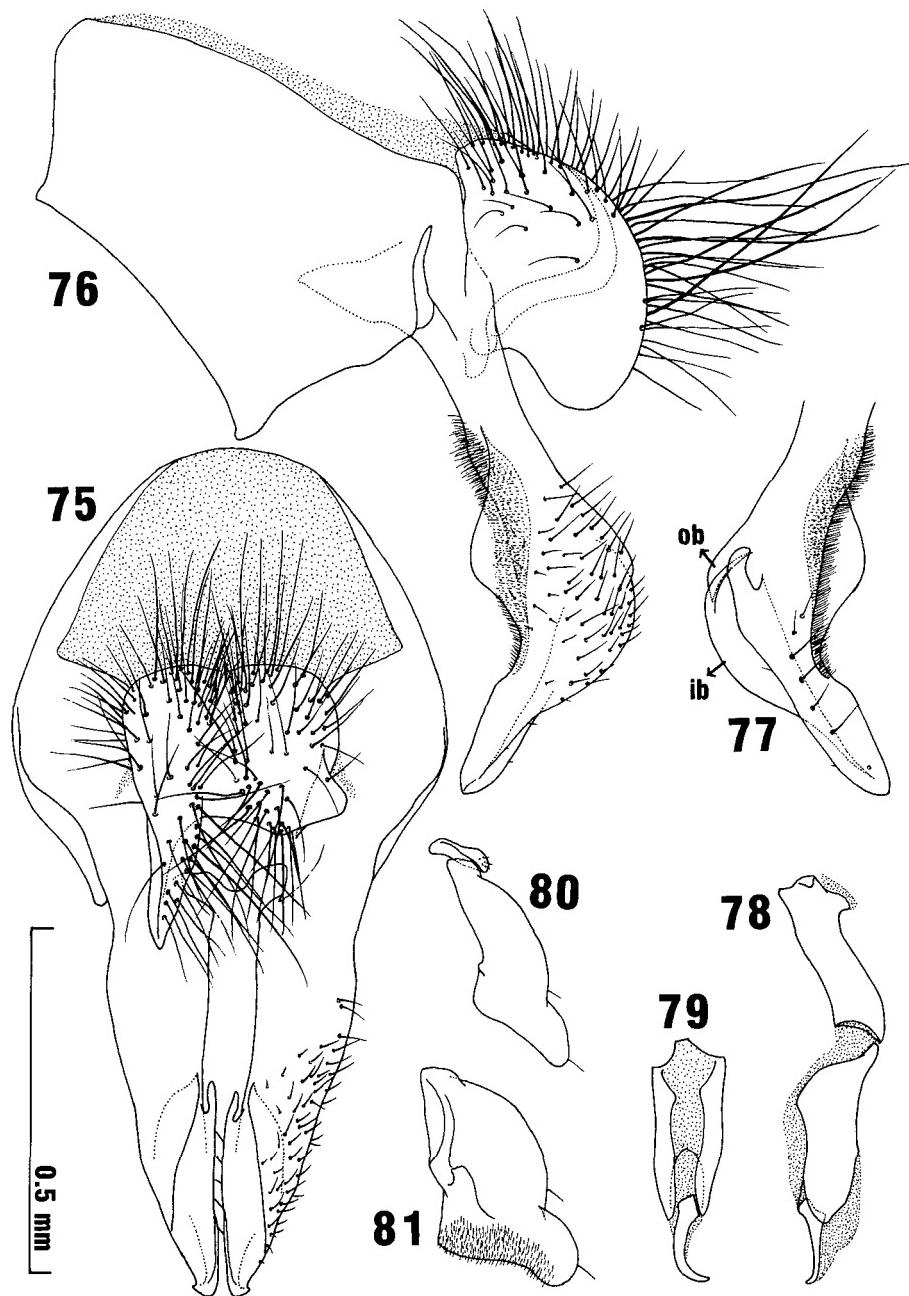
Abdomen well swollen posteriorly (Figs. 161-162), with terminalia as in the figures; 5th sternite with processes gradually narrowed apically; epandrium protruded anterodorsally (posteriorly in undissected specimens) and acute there in profile, with an almost complete row of setae along inner margin surrounding anus; cercal plate with left distal lobe a little concave outside; surstyli slightly



Figs. 73-74. *Phorbia nepalensis* Suwa, ♂. 73, 5th sternite, ventral view; 74, process of 5th sternite, ventrolateral view. Sing Gompa - Gosainkund.

asymmetrical to each other, with inside lobe prominently projected cephalad, and with outside lobe divided into inner and outer blades by a dorsomedial notch (Fig. 77); right pregonite densely pilose inside near ventral margin; left pregonite with pilosity less developed than that of right one and easily to hardly discernible.

Mid femur with 1 or a few distinct or usually strong *av* on median third and some weaker *av* on basal third to half, often with some *av* more or less developed on distal part beyond the strong *av*, and with some (4-8) *pv* on basal half to two-thirds, most of the *pv* well developed and strong; f_3 with a row of 5-9 strong *av*, and with 1 or a few weak *pv* near base and 2-4 distinct or rather strong *pv* on median third, the longest *pv* being variable in length, shorter to a little longer than f_3 -height; t_1 with 1 or sometimes 2 *pv* and usually no *ad*; t_2 with 1 (rarely 0 or 2) *av*, 1 *ad*, usually 2 *pd* and 2 or sometimes 3 *pv*; t_3 with 3 or sometimes 4 *av*, 3-5 *ad*, 3-7 (2-4 strong and 1 or a few weaker) *pd* and 1 or a few *pv*. Wings with costal thorns



Figs. 75-81. *Phorbia nepalensis* Suwa, ♂. 75, hypopygium, dorsal view; 76, ditto, lateral view; 77, left surstylius, inside view, ib, inner blade, ob, outer blade; 78, basiphallus and distiphallus; 79, distiphallus, ventral view; 80, left pregonite and postgonite; 81, right pregonite, inside view. Sing Gompa - Gosainkund.

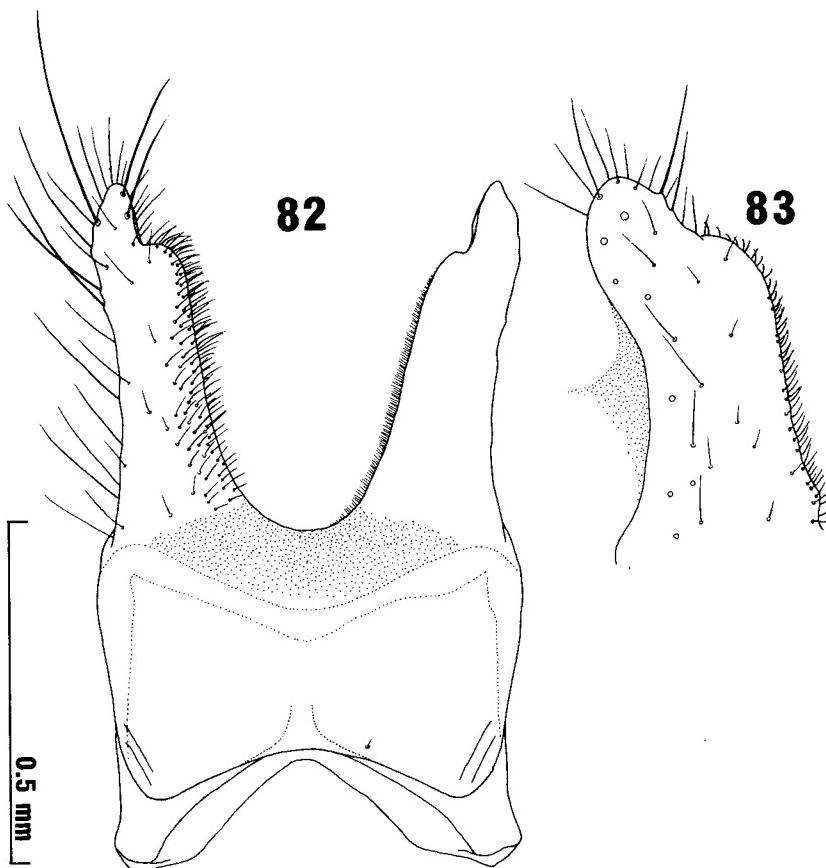
small, distinctly shorter than *h*-vein.

Remarks. This species is easily distinguished from any other known species from Nepal by the well-protruded epandrium without dissecting genitalia. *P. nepalensis* is closely related to the succeeding *omeishanensis*, being very similar in the terminalia. The Japanese *P. asymmetrica* has terminalia (cf. Figs. 475-479, Suwa, 1974, Fig. 68, Suwa, 1977, and Fig. 166, present paper) of the same type, and may be closely related to *nepalensis* and *omeishanensis*.

6. *Phorbia omeishanensis* Fan
(Figs. 82-90, 160, 167-168)

Phorbia omeishanensis Fan, in Fan et al., 1982: 234; Fan et al., 1988: 142.

Material examined. Bagmati: Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 8♂, 27. v. 1988. Two specimens are preserved in EDAN. See also

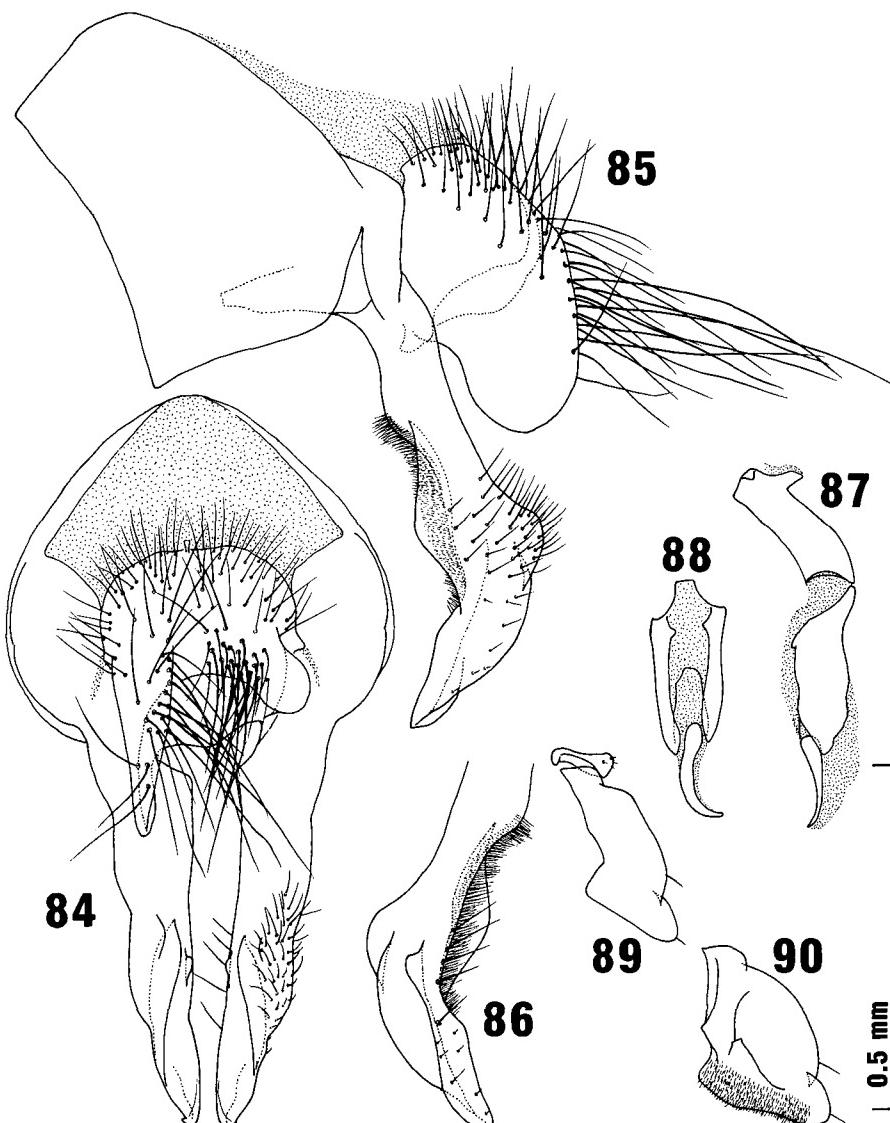


Figs. 82-83. *Phorbia omeishanensis* Fan, ♂. 82, 5th sternite, ventral view; 83, process of 5th sternite, ventrolateral view. Magen Gotha - Thare Pati.

Appendix.

♂. Closely related to *nepalensis*. Wing-length 3.6-4.4 mm. Pollinosity darker than in *nepalensis*; brownish grey on orbits, a little paler on cheeks; mesonotum brownish pollinose, paler peripherally, with brownish pollinose vittae hardly differentiated.

Frons usually a little wider than anterior ocellus; interfrontalia narrower than



Figs. 84-90. *Phorbia omeishanensis* Fan, ♂. 84, hypopygium, dorsal view; 85, ditto, lateral view; 86, left surstylius, inside view; 87, basiphallus and distiphallus; 88, distiphallus, ventral view; 89, left pregonite and postgonite; 90, right pregonite, inside view. Magen Gotha - Thare Pati.

anterior ocellus, with *if* vestigial or lacking, at most slightly developed; 5-6 *ori*; A_3 1.6-1.9 times as long as wide; arista with the longest hairs slightly to distinctly shorter than basal diameter of arista; orbits as wide as to distinctly wider than (up to about 1.5 times) A_3 ; cheeks about as high as orbital width.

Mesonotum with 2-5 *pre-acr*; 2nd *ph* fine or absent, at most slightly stronger than adjacent setulae; scutellum sparsely to rather densely haired ventrally.

Abdomen with terminalia as in the figures; 5th sternite with processes abruptly narrowed apically; epandrium obtuse at anterodorsal corner in profile, with inner marginal setae very sparse anteriorly and not forming a complete row; cercal plate with left distal lobe not concave outside; surstyli slightly asymmetrical, with inside lobe less developed and only a little projected dorsad near anterior joint, and with outer blade of outside lobe more prominently expanded dorsad than the inner blade in profile; left pregonite with inside pilosity sparser than that of right pregonite and sometimes hardly discernible.

Mid femur usually with 1 or a few strong *av* on median third and with 3-6 strong *pv* on basal half to two-thirds; t_1 with no *ad* and 1 *pv*; t_3 with 2-4 (usually 3) *av*, 3 or sometimes 2 *ad*, 2-6 (variable in length) *pd* and 1 or a few *pv*.

Remarks. *P. omeishanensis* was described on the basis of a single male specimen collected at Mt. Omeishan, Sichuan, China. The present material from Nepal differs from the original description of the species in the surstyli with outer blade of the outside lobe more prominently expanded dorsad (cf. Fig. 57, Fan et al., 1982), yet is referred to the species by the cercal plate with right distal lobe rounded apically and with posteroventral margin distinctly oblique in dorsal view, and by the epandrium not protruded anterodorsally.

It is often difficult to distinguish the present species from *morulina* or *subsymmetrica* rather than from *nepalensis* unless its genital structures are examined. The wings with small costal thorns, the mid tibia usually with *av*, and the 5th sternite with processes abruptly narrowed apically are helpful in identifying dried specimens in good condition.

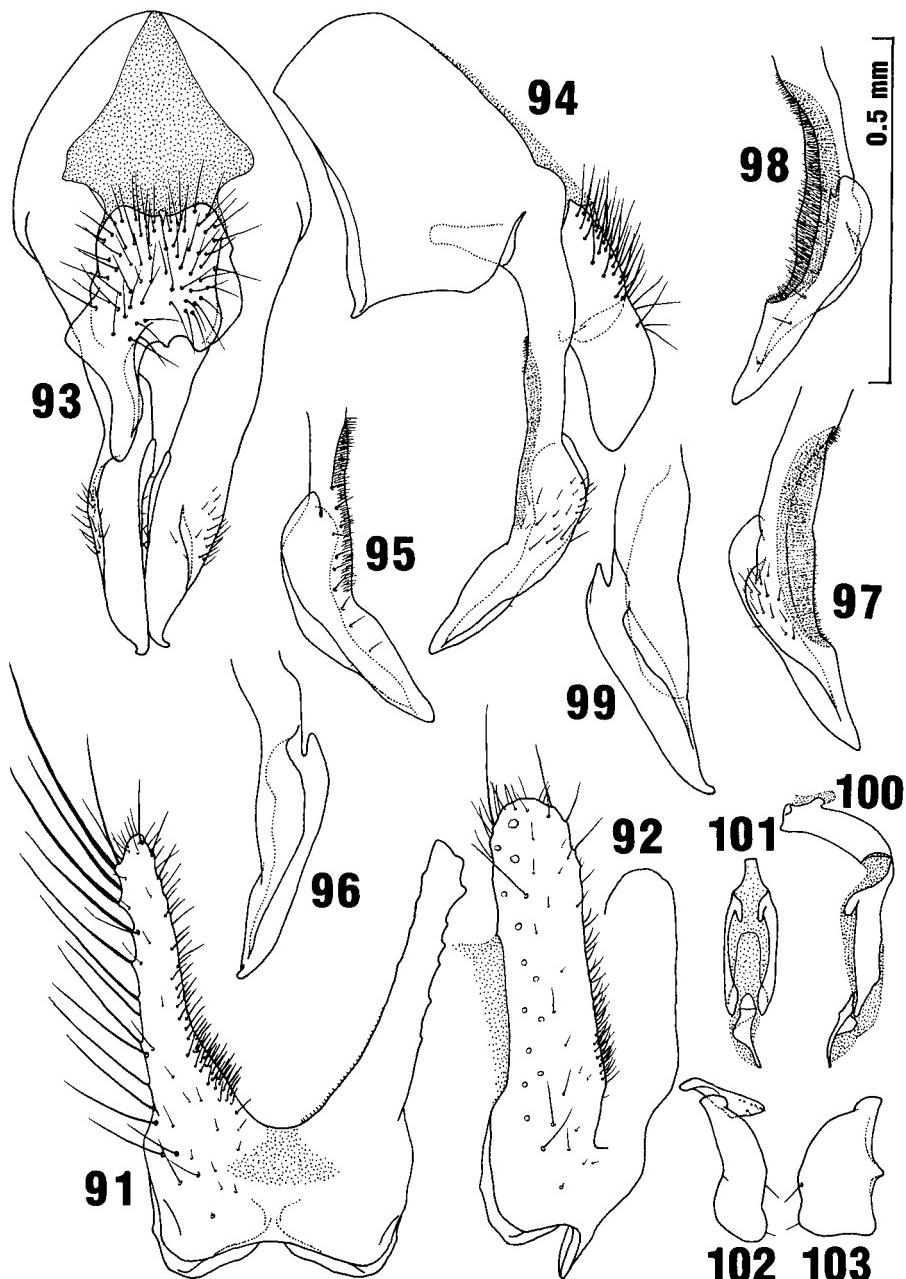
7. *Phorbia tysoni* Ackland (Figs. 91-103)

Phorbia tysoni Ackland, 1967: 129; Fan et al., 1988: 140.

Material examined. Gandaki: Pisang - Hunde, 3,100-3,350 m, Marsyandi Valley, 6♂, 16. vi. 1988. Two specimens are preserved in EDAN.

♂. Wing-length 3-3.4 mm. Pollinosity with bluish colour discernible in some lights on main areas even if strongly tinged with brown; orbits whitish grey pollinose, more or less tinged with brown; cheeks pale brownish grey or dull grey pollinose; occiput bluish grey pollinose, distinctly tinged with brown; mesonotum distinctly or strongly tinged with brown in pollinosity; abdomen brownish grey pollinose. Halteres slightly darkened at knob.

Frons as wide as or a little wider than anterior ocellus; interfrontalia about half as wide as anterior ocellus, with *if* minute to rather distinct; 4-5 *ori*; A_3 about 1.6 times as long as wide; arista with the longest hairs as long as or a little shorter than basal diameter of arista; orbits slightly narrower (somewhat wider in 1 specimen)



Figs. 91-103. *Phorbia tysoni* Ackland, ♂. 91, 5th sternite, ventral view; 92, ditto, ventrolateral view; 93, hypopygium, dorsal view; 94, ditto, lateral view; 95, left surstylius, inside view; 96, ditto, dorsolateral view; 97, right surstylius, lateral view; 98, ditto, inside view; 99, ditto, dorsolateral view; 100, basiphallus and distiphallus; 101, distiphallus, ventral view; 102, left pregonite and postgonite; 103, right pregonite. Pisang - Hunde.

than A_3 ; cheeks as high as or a little higher (slightly lower in the specimen with wider orbits) than orbital width; epistoma situated slightly behind parafrontal angle.

Mesonotum with 4 (3 in 1 specimen) *pre-acr*; 2nd *ph* fine or slightly developed; mesopleura usually with 1-2 associated setulae around *pstg*; scutellum with some hairs visible on ventral surface.

Abdomen with terminalia as in the figures; 5th sternite with processes very long, as long as or a little longer than 2.5 times the median length of basal plate, and nearly parallel-sided on main part in lateral view; cercal plate with setae all short, with left distal lobe well developed and bare; surstyli asymmetrical to each other, the right one deeply concave on ventral haired area, but the left one not; pregonites with inside pilosity indiscernible.

Mid femur with 0-2 strong *av* near middle and 3-4 strong *pv* on basal half; f_3 with 4-7 strong and a few or some weak *av*, and with 3-4 *pv* on basal half, the longest *pv* shorter than f_3 -height; t_1 with 1 (2 on right leg in 1 specimen) *pv*; t_2 with 0-1 *av*, 1 *ad*, 2 (1 in 2 specimens) *pd* and 2 *pv*; t_3 with 2-3 (4 on left leg in 1 specimen) *av*, 2-3 *ad*, 2-3 strong and often 1-2 much weaker *pd* and 0-3 *pv*. Wings with costal thorns distinct, as long as or slightly longer than *h*-vein; costal spinules rather prominent, as long as or a little longer than twice the costal width.

Remarks. The 5th sternite with long and parallel-sided processes is a good character for distinguishing this species without dissection of genitalia. The pregonites with less concave caudal margin are characteristic of *tysoni* in the *morula* subgroup.

8. *Phorbia lobatooides* Suwa

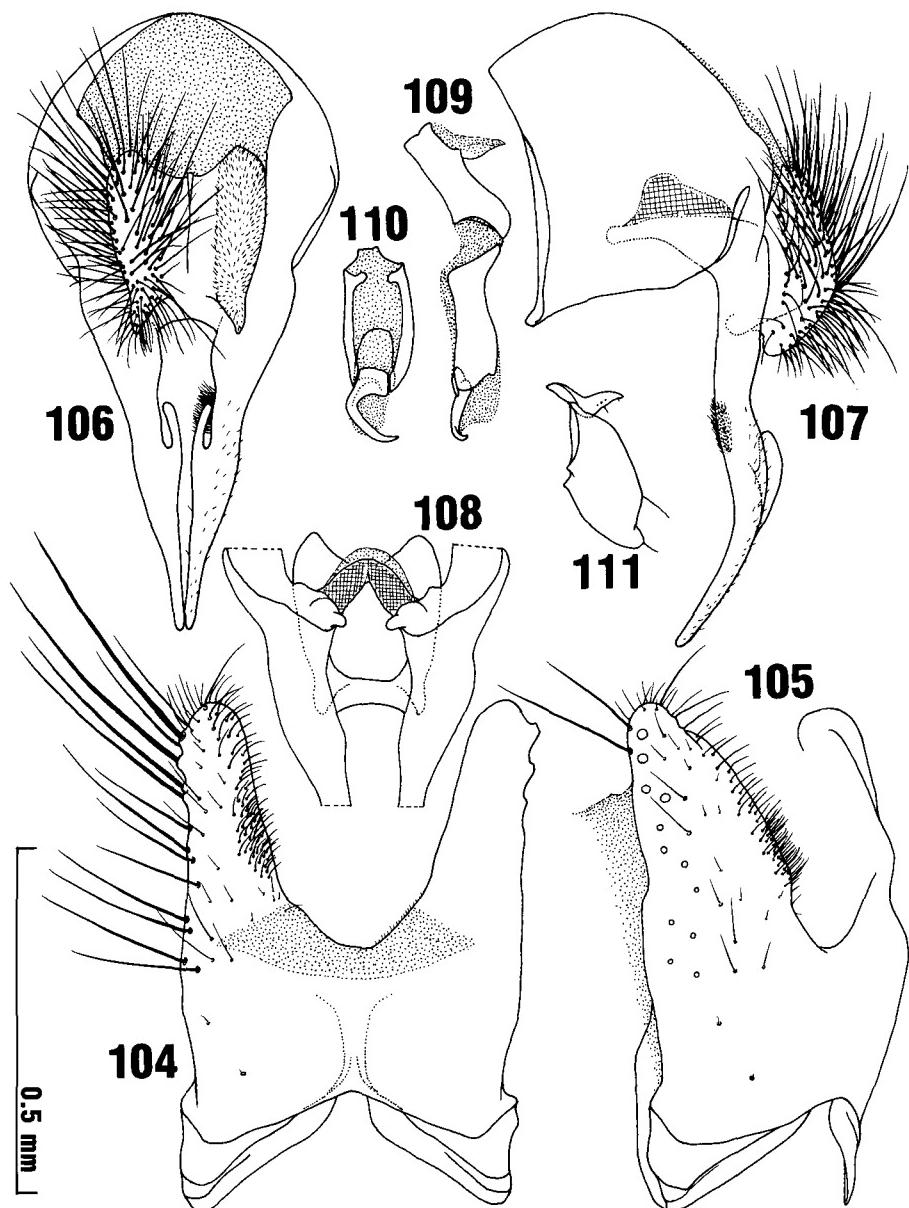
(Figs. 104-111, 163)

Phorbia lobatooides Suwa, 1977: 41.

Material examined. Bagmati: Ghora Tabela (=Ghora Tobela), ca. 3,000 m, Langtang Valley, 1♂ (holotype), 23. ix. 1975 (S. Takagi), and 1♂, 20. v. 1988; Ghora Tabela - Langtang, 3,000-3,400 m, 3♂, 12-19. ix. 1983, and 8♂, 15-19. v. 1988; "Lama Hotel" - Ghora Tabela, 2,500-3,000 m, 2♂, 19. ix. 1983, and 1♂, 15. v. 1988. Two specimens are preserved in EDAN, and another in BM.

♂. Wing-length 3.3-4.4 mm. Pollinosity whitish grey and slightly bluish, partly brownish especially on dorsum; interfrontalia brownish grey; orbits whitish grey, usually tinged with brown along rows of *ori*, on upper linear part, and along anterior margin of parafacials; cheeks whitish grey, with a brownish tinge near vibrissal angle, or dull grey entirely; mesonotum brownish grey, much paler peripherally; abdomen a little to rather strongly tinged with brown. Halteres scarcely darkened at knob.

Frons slightly to distinctly wider than anterior ocellus, 1.2-1.5 times as wide as the latter in most specimens; interfrontalia usually narrower than anterior ocellus, with *if* minute to rather strong; 4-7 *ori*; A_3 less than twice the width in length, usually 1.7-1.8 times as long as wide; arista with the longest hairs slightly to distinctly longer than basal diameter of arista; orbits only a little to rather distinctly wider than A_3 ; cheeks as high as or a little higher than orbital width; epistoma



Figs. 104-111. *Phorbia lobatoides* Suwa, ♂. 104, 5th sternite, ventral view; 105, ditto, ventrolateral view; 106, hypopygium, dorsal view; 107, ditto, lateral view, checked area indicating chitinous expansion at inside base of surstyli; 108, ditto, ventral view, showing median part only; 109, basiphallus and distiphallus; 110, distiphallus, ventral view; 111, pregonite and postgonite. "Lama Hotel" - Ghora Tabela.

situated a little behind parafrontal angle.

Mesonotum with 2-6 *pre-acr*; 2nd *ph* fine or slightly developed; scutellum sparsely to rather densely haired on ventral side.

Abdomen with terminalia as in the figures; 5th sternite with processes a little longer than 1.5 times the median length of basal plate; cercal plate broadly grooved medially, thus divided into 2 pads, with a carina on the groove medially; the pads densely setose, with the longest setae about as long as the pads; surstyli symmetrical, with a conspicuous lobe present near middle inside, and with a small tuft of hairs on ventral side a little anterior to the lobe; pregonites symmetrical, usually without inside pilosity, at most with a small and sparse patch of piles; genital pouch with right process membranous and fingerstall-like.

Mid femur with, or often without, 1 or a few strong *av* on median third, and with some (3-7) strong *pv* on basal half to two-thirds; f_3 with 5-8 strong *av*, and with 1 rather distinct *pv* near base, 1-2 weak *pv* near basal fourth or third, and 1 or a few distinct to strong *pv* on median third, the longest *pv* near middle usually a little to distinctly longer than f_3 -height; t_1 with, or sometimes without, 1 *ad*, and with 1-2 *pv*; t_2 with 1 *ad*, 2 *pd* and 2 *pv*, and with no *av*; t_3 with 2-4 (usually 3) *av*, 2-5 (not uniform in length) *ad*, 3-5 (not uniform in length) *pd*, often 1 or a few additional *pd* on apical fourth, and 1 or a few (sometimes no) *pv*. Wings with costal thorns small to rather strong, and distinctly shorter than to as long as *h*-vein.

Remarks. As mentioned in the original description, the present species resembles the N. American *Phorbia lobata* (Huckett, 1929) in having the cercal plate practically divided into 2 setose pads and the 5th sternite with processes not notched on inner margin. If the shadowed area in the figure of male hypopygium of *lobata* in the original description (cf. Fig. 24, Huckett, l.c.) indicates the chitinous expansion at the inside base of the surstyli, this species undoubtedly belongs to the same group as *lobatoides*. In that case, the absence of a tuft of hairs on the surstyli in *lobata* may be interpreted as a secondary loss. Judging from the surstyli without an inside lobe, *P. lobata* might be more closely related to the succeeding *pilostyla* than to *lobatoides*, although the loss of a character is not a good evidence for relationship.

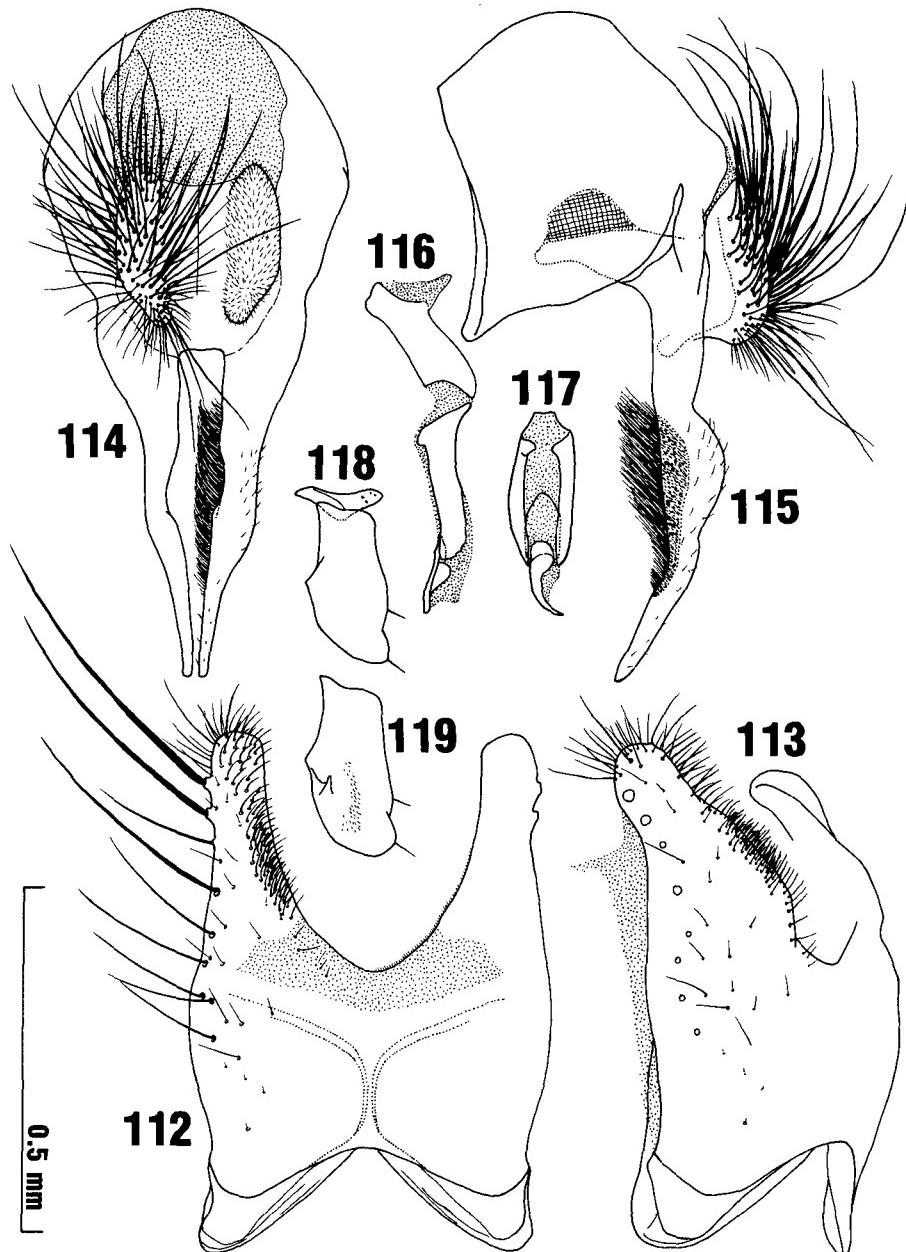
9. *Phorbia pilostyla* Suwa

(Figs. 112-118, 169)

Phorbia pilostyla Suwa, 1977: 43; Fan et al., 1988: 142.

Material examined. Bagmati: Bangel Kharka, ca. 3,200 m, Helambu, 1♂ (holotype), 7. vi. 1968 (T. Kumata); Langtang - Kyanjing, 3,400-3,800 m, 1♂, 14-18. ix. 1983, and 1♂, 16-18. v. 1988. Janakpur: Shakpa - Chusa Kharka, 3,000-3,400 m, Rolwaling Valley, 1♂, 13. viii. 1983; Nangaon, 4,000-4,100 m, Rolwaling Valley, 1♂, 18. viii. 1983; Dongo Kharka - Beding, 3,000-3,300 m, Rolwaling Valley, 1♂, 22-23. viii. 1983. One specimen from Langtang - Kyanjing is preserved in EDAN.

♂. Wing-length 3.9-4.6 mm. Pollinosity brownish grey or mainly bluish grey; orbits and cheeks faintly to distinctly tinged with brown; mesonotum brownish grey with paler peripheral regions, or bluish grey with brownish vittae weakly discernible along rows of setae; abdomen wholly brownish grey, or bluish grey and with a brownish median vitta discernible in frontal view. Halteres yellow or reddish at



Figs. 112-119. *Phorbia pilostyla* Suwa, ♂. 112, 5th sternite, ventral view; 113, ditto, ventrolateral view; 114, hypopygium, dorsal view; 115, ditto, lateral view; 116, basiphallus and distiphallus; 117, distiphallus, ventral view; 118, left pregonite and postgonite; 119, right pregonite, inside view. Nangaon.

knob.

Frons 1.6-2 times as wide as anterior ocellus; interfrontalia as wide as to distinctly wider than anterior ocellus, with *if* rather weak to strong (minute in 1 specimen); 6-9 *ori*; A_3 1.6-1.8 times as long as wide; arista with the longest hairs about as long as basal diameter of arista; orbits slightly to distinctly wider than A_3 ; cheeks as high as or higher than orbital width; epistoma protruded as far as, or situated a little behind, parafrontal angle.

Mesonotum with 3-5 *pre-acr*; 2nd *ph* more or less developed though much shorter than the 1st (in holotype the real 2nd *ph* fine, yet a well-developed seta, as strong as the 1st *ph*, present between the 2nd *ph* and *prst*; this is unusual in the specimens examined); scutellum sparsely to rather densely haired ventrally.

Abdomen with terminalia as in the figures; 5th sternite with processes slightly shorter than 1.5 times the median length of basal plate; cercal plate with the longest setae much longer than the plate itself; surstyli rather distinctly asymmetrical, the right one being broader than the left in dorsal view and more densely haired; pregonites rather sparsely and narrowly pilose inside, the right one slightly larger than the left; genital pouch with right process chitinous and thumb-shaped.

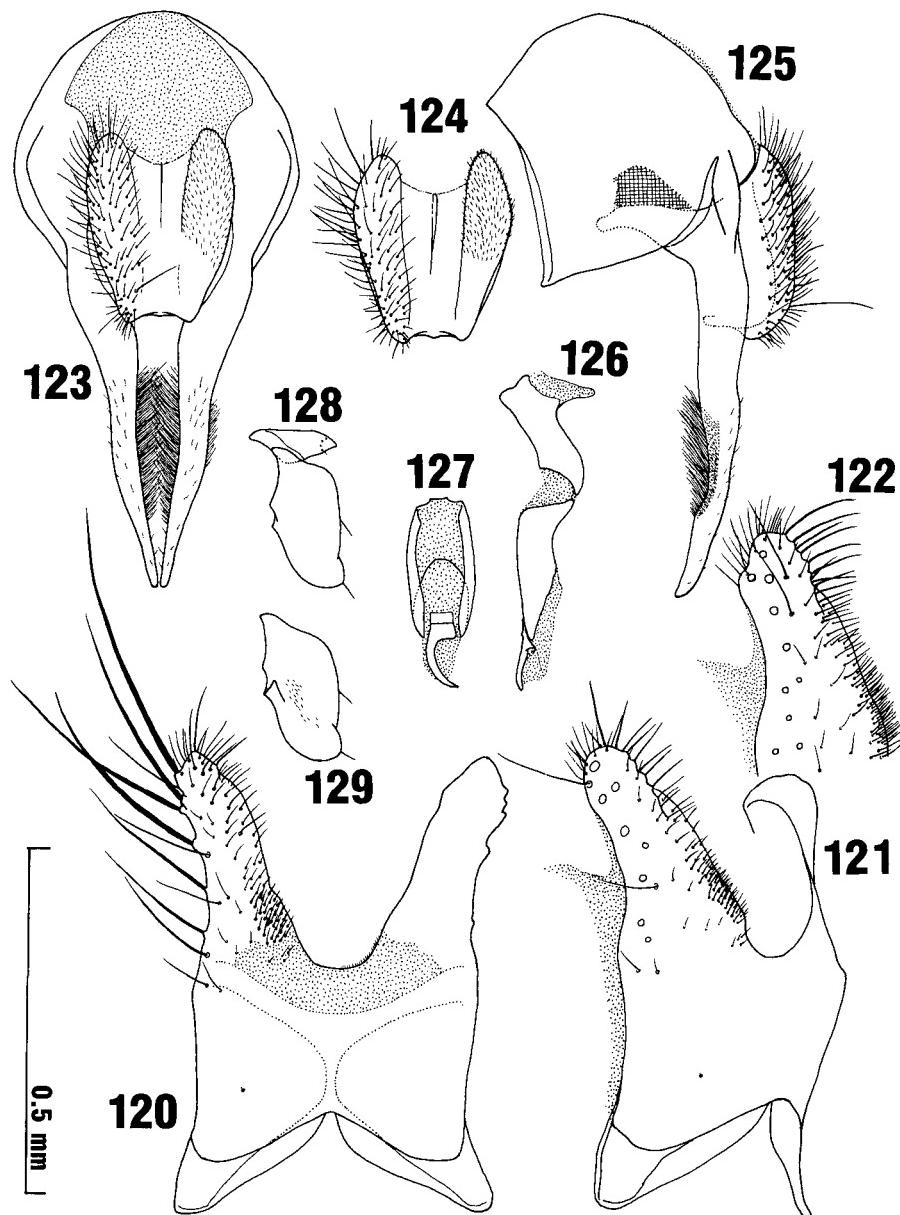
Mid femur with 1 or a few strong *av* on median third and some (4-7) strong *pv* on basal half to two-thirds; f_3 with a row of 7-9 strong *av*, and with some *pv* on basal half to two-thirds, the longest one near middle distinctly longer than f_3 -height; t_1 with 1-2 *pv*, and with some setulae on distal third to half of anterodorsal surface more or less developed, in 2 specimens with a distinct *ad* visible; t_2 with 1 *av* (lacking in 2 specimens), 1 *ad*, 2 *pd* and 2 *pv*; with 3-4 *av*, 3-5 *pd* and 0-5 *pv*. Wings with costal thorns as long as or a little shorter than *h*-vein.

Remarks. A closely related species to *pilostyla* has been known from Sichuan, China, namely *Phorbia gemmullata* Feng et al., 1984, which differs from *pilostyla* mainly in the surstyli not expanded dorsad and with a small process near apical third inside, and in the cercal plate with pads concave on distal half outside. The small process on the surstyli in *gemmullata* may be homologous with the inside lobe of the surstyli in *lobatooides* and also in the *morula* subgroup. The surstyli of *pilostyla* lacking a lobe or process may have been derived from those with such a lobe or process. If the asymmetry in surstyli and in pregonites of *pilostyla* originated from the common ancestor of the *morula* and *lobatooides* subgroups, the symmetry in these features of certain species of both the subgroups (though the pregonites always asymmetrical in the *morula* subgroup) must be secondary and reversal. To the contrary, it might be the case that the asymmetry in these features have evolved on each lineage independent of the other. *Phorbia ponti* Hennig, 1969, from Germany, *Phorbia personi* Hennig, 1976, from Siberia and China (Xinjiang), and *Phorbia hypandrium* Li et Deng, 1981, from China (Sichuan) may possibly belong to the *lobatooides* subgroup. Studies on these species may give clues to understand the phylogeny of this subgroup.

10. *Phorbia pilostyloides* sp. nov.

(Figs. 120-129)

Type material. Bagmati: Sing Gompa - Gosainkund, 3,300-3,700 m, 2♂ (one the holotype), 24. v. 1988.



Figs. 120-129. *Phorbia pilostyloides* sp. nov., ♂. 120, 5th sternite, ventral view; 121, ditto, ventrolateral view; 122, process of 5th sternite, ventrolateral view; 123, hypopygium, dorsal view; 124, cercal plate; 125, hypopygium, lateral view; 126, basiphallus and distiphallus; 127, distiphallus, ventral view; 128, left pregonite and postgonite; 129, right pregonite, inside view. Holotype (122, 124) and paratype (120-121, 123, 125-129) from Sing Gompa - Gosainkund.

♂. Wing-length 3.5-3.6 mm. Pollinosity mainly brownish grey; orbits and cheeks dull grey or pale brownish grey; mesonotum brownish grey, paler peripherally; abdomen brownish grey. Halteres yellow at knob, scarcely darkened.

Frons 1.6 times as wide as anterior ocellus; interfrontalia about as wide as anterior ocellus, with *if* weak though easily discernible; 3 strong and 1 or a few weak *ori*; A_3 1.7-1.8 times as long as wide; arista with the longest hairs as long as or slightly shorter than basal diameter of arista; orbits rather distinctly wider than A_3 ; cheeks distinctly higher than orbital width; epistoma situated a little behind parafrontal angle.

Mesonotum with 4 (namely 2 pairs) *pre-acr*; 2nd *ph* fine; scutellum sparsely haired on ventral surface (about 5 hairs discernible in the present material).

Abdomen with terminalia as in the figures; 5th sternite with processes about 1.5 times as long as median length of basal plate; cercal plate with short setae only; surstyli almost symmetrical, the right one slightly wider than the left in dosal view and more densely haired; pregonites symmetrical, sparsely pilose inside; genital pouch with right process chitinous and thumb-shaped.

Mid femur with 1 strong *av* near middle and some (about 5) strong *pv* on basal half to two-thirds; f_3 with a row of about 8 strong *av*, and with some *pv* on basal half to two-thirds, the longest *pv* in median third being longer than f_3 -height; t_1 with 1 *ad* (absent on right leg in paratype) and 1 *pv* (2 on left leg in paratype); t_2 with 1 *av*, 1 *ad*, 2 *pd* and 2 *pv*; t_3 with 3 (2 on left leg in paratype) *av*, 2 strong and 2 weaker *ad*, 3 strong and 1 or a few weaker *pd* and a few *pv*. Wings with costal thorns slightly or rather distinctly shorter than *h*-vein.

Remarks. The present species is closely related to the preceding *pilostyla* in the practically divided cercal plate and in the surstyli densely haired ventrally and without a lobe or process inside. The shortly setose cercal plate of *pilostyloides* is quite unique among the members of the *morula* group and may indicate an advanced condition of the plate. In the shortly setose cercal plate *P. pilostyloides* resembles *P. hypandrium*, in which the plate is, however, not broadly divided medially (cf. Fig. 10, Li et Deng, 1981).

11. *Phorbia pilicercata* Suwa

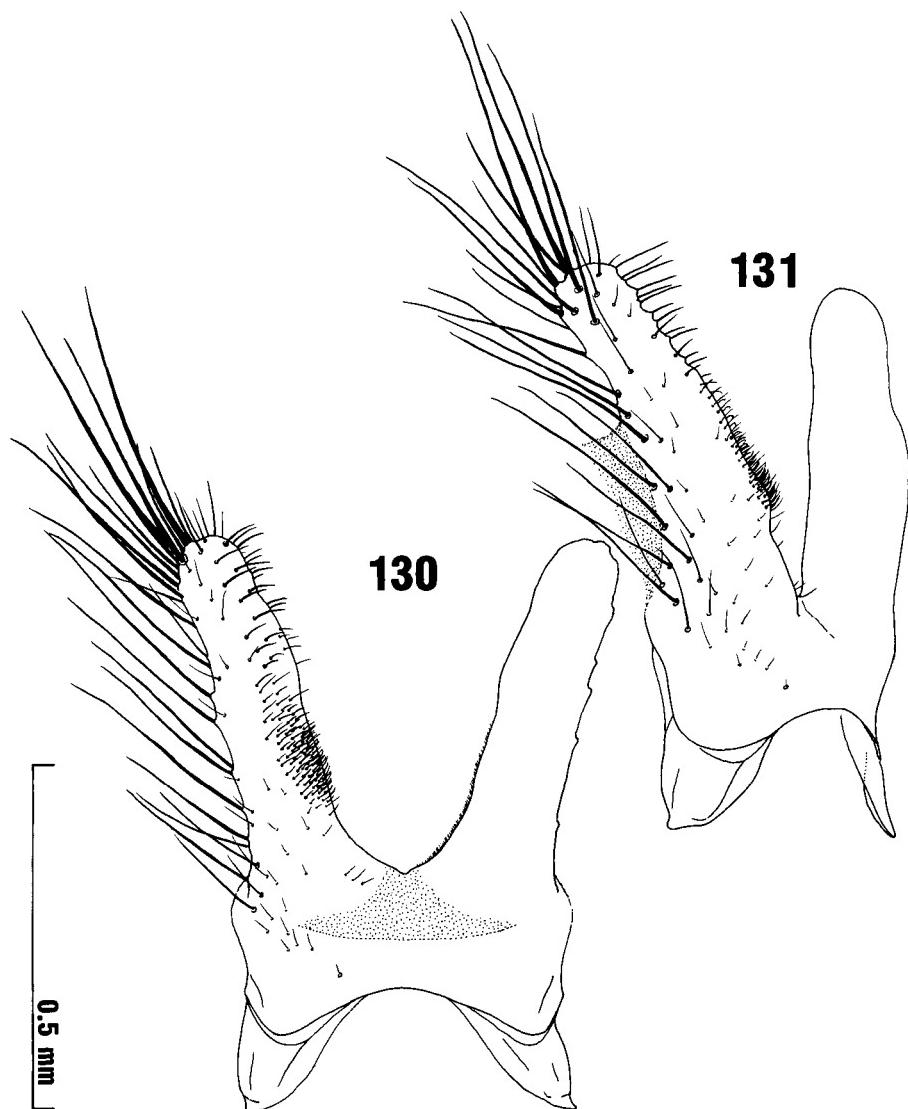
(Figs. 130-137, 170)

Phorbia pilicercata Suwa, 1977: 39.

Material examined. Dhaulagiri: Ulleri, ca. 2,000 m, 3♂ (the type series), 11. v. 1968 (T. Kumata). Bagmati: Ghopte - Gosainkund, 3,500-4,000 m, 2♂, 25. v. 1988; Magen Gotha - Thare Pati, 3,200-3,600 m, Helambu, 2♂, 27. v. 1988. One specimen from Ghopte - Gosainkund is preserved in EDAN.

♂ Wing-length 4-4.5 mm. Pollinosity pale grey or bluish grey, tinged with brown especially on dorsum of the body; interfrontalia brownish grey; orbits whitish grey, hardly to slightly tinged with brown; cheeks whitish grey to dull grey; mesonotum brownish grey, paler peripherally and also between median line and each *dc*-row, the pollinosity almost entirely discernible even in caudal angle of view though rather weakly; abdomen pale brownish grey. Halteres yellow at knob.

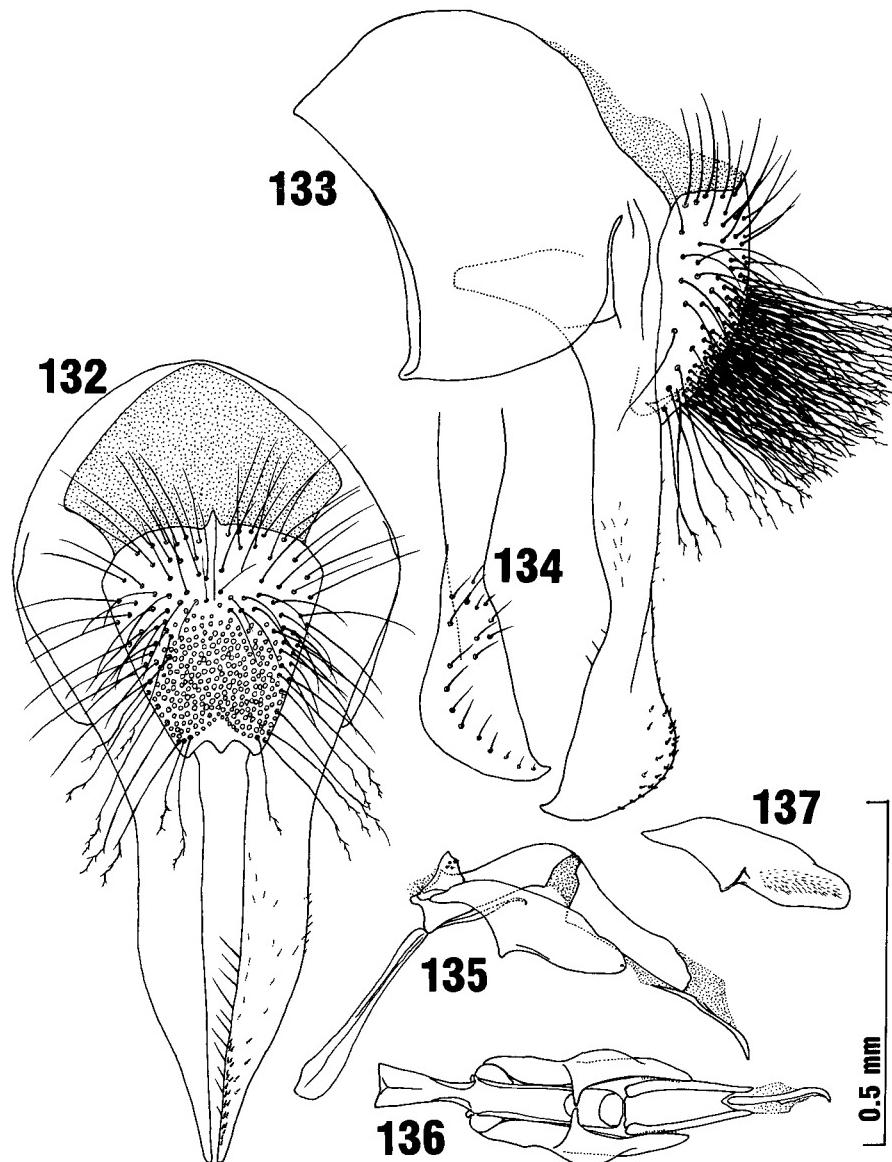
Frons 1.5-2 times as wide as anterior ocellus; interfrontalia a little wider than



Figs. 130-131. *Phorbia pilicera* Suwa, ♂. 130, 5th sternite, ventral view; 131, ditto, ventrolateral view. Magen Gotha - Thare Pati.

anterior ocellus, with *if* distinct; 4-6 *ori*; A_3 1.6-1.9 times as long as wide; arista with the longest hairs as long as or slightly shorter than basal diameter of arista; orbits slightly to distinctly wider than A_3 ; cheeks as high as or a little higher than orbital width; epistoma protruded as far as, or situated slightly behind, parafrontal angle.

Mesonotum with no *pre-acr* (a single setula visible only in 1 specimen), and with 4-6 (2-3 pairs) *post-acr*, including *prsc-acr*; 2nd *ph* fine; scutellum sparsely haired on ventral surface, with a few or some hairs discernible.



Figs. 132-137. *Phorbia pilicerca* Suwa, ♂. 132, hypopygium, dorsal view; 133, ditto, lateral view; 134, left surstyulus, inside view; 135, aedeagus, lateral view; 136, ditto, ventral view; 137, right pregonite, inside view. Magen Gotha - Thare Pati.

Abdomen with terminalia as in the figures; 5th sternite with processes rod-like and about thrice as long as median length of basal plate; cercal plate densely covered with ramified setae on more than distal half, the setae being shorter than the plate; surstyli loosely convex near middle ventrally, with small and stout setae along and near dorsal edge of distal blade; pregonites almost symmetrical, distinct-

ly pilose inside, and with no setae, only a very minute setula discernible at apex under careful examination; distiphallus with acrophallus sting-like and slightly curved to the right at apex.

Mid femur with a few strong *av* on median third and some (4-6) strong *pv* on basal half to two-thirds; f_3 with a row of 5-8 strong *av*, and with some *pv* on basal half to two-thirds, the strongest *pv* in median third being as long as to distinctly longer than f_3 -height; t_1 with 1 *ad* and 1 *pv*; t_2 with 1 *ad*, 2 *pd* and 2 *pv*, and with 2 *av* (3 in 1 specimen, 1 on right leg in another specimen); t_3 with 3 *av*, 2-3 *ad*, 2-4 (usually 3) strong and a few or some much weaker *pd* and 1 or a few *pv*. Wings with costal thorns slightly shorter to rather distinctly longer than *h*-vein.

Remarks. This species has a close affinity with *P. penicillaris* and others: 5th sternite with rod-like processes; cercal plate with a dense tuft of setae; surstyli with a bladed distal part and with small spine-like setae scattered on the blade; distiphallus with a sting-like acrophallus. On the other hand, *P. pilicerca* is clearly different from them in some features: 5th sternite with processes not notched or emarginated on inner margin near apex, and thereon with no spine-like setae; cercal plate with the tuft composed of ramified setae; pregonites narrowed and lengthened, with median seta completely vanished; parafrontals with *ors* lacking; mesonotum with no *pre-acr*. These characters are undoubtedly apomorphic and all are shared with the succeeding two new species.

12. *Phorbia seticauda* sp. nov.

(Figs. 138-147)

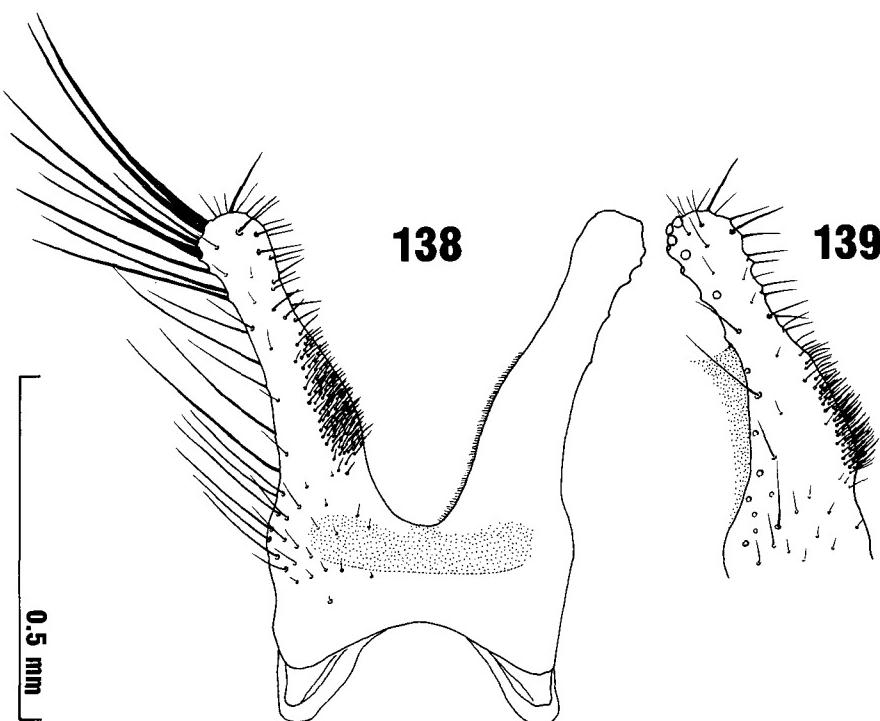
Type material. Gandaki: Bratang - Pisang, 2,800-3,200 m, Marsyandi Valley, 1♂ (holotype), 17. vi. 1988.

♂. Wing-length 4.3 mm. Pollinosity bluish grey, partly tinged with brown especially on dorsum; interfrontalia pale brownish grey; orbits silvery grey; cheeks whitish grey, faintly tinged with brown; mesonotum brownish grey, darker along rows of setae, pale grey peripherally, when viewed from behind largely blackish and partly pollinose; abdomen brownish grey. Halteres yellow at knob, very slightly darkened.

Frons 1.8 times as wide as anterior ocellus; interfrontalia 1.3 times as wide as anterior ocellus, with *if* distinct; 5 *ori*; A_3 1.7 times as long as wide; arista with the longest hairs about as long as basal diameter of arista; orbits 1.3 times as wide as A_3 ; cheeks 1.2 times as high as orbital width; epistoma situated a little behind parafrontal angle.

Mesonotum with no *pre-acr*, and with 4 (2 pairs) *post-acr*, inclusive of *prsc-acr*; 2nd *ph* fine; scutellum rather sparsely haired ventrally, with about 10 hairs discernible.

Abdomen with terminalia as in the figures; 5th sternite with processes about thrice as long as median length of basal plate and more or less constricted near apex; cercal plate deeply concave distally, with ventromedian keel unobservable in dorsal view, yet appearing in dorsocaudal view, and with a tuft of ramified setae covering less than distal half, most of the setae longer than the plate; surstyli distinctly convex near middle ventrally, and with small spine-like setae scattered on dorsal half of distal blade; pregonites with no setae except for a very minute apical

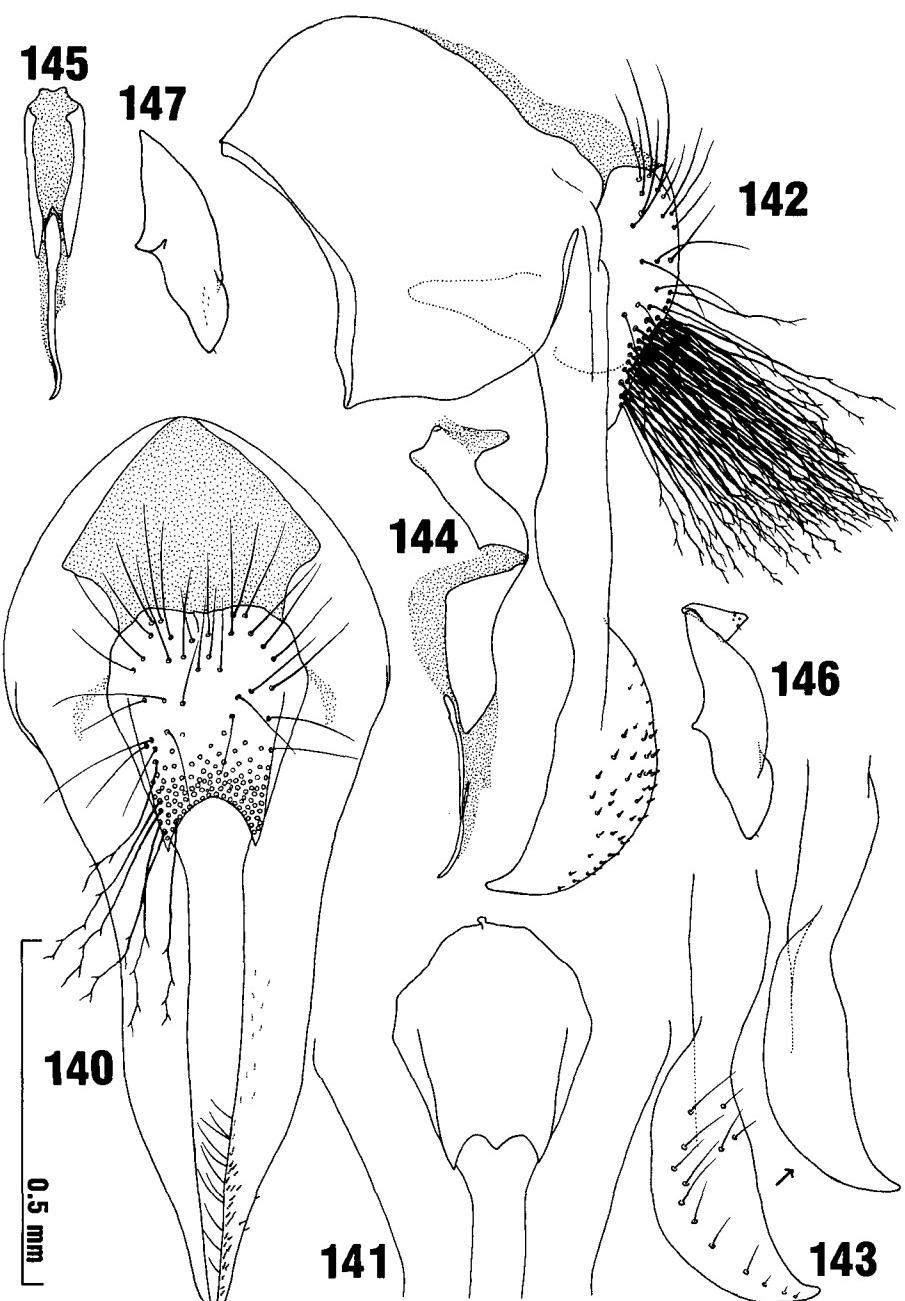


Figs. 138 139. *Phorbia seticauda* sp. nov., ♂. 138, 5th sternite, ventral view; 139, process of 5th sternite, ventrolateral view. Holotype from Bratang - Pisang.

setula, and with inside pilosity very sparse; acrophallus slightly curved to the right apically.

Mid femur with 4 strong *av* on median third (the distalmost *pv* on right leg actually occurring near apical fourth), and with 5-6 strong *pv* on basal two-thirds; *f*₃ with a row of 7-8 strong *av*, with some (about 6) *pv* on basal half or two-thirds, a few *pv* near base being much weaker than the others, the longest *pv* near basal third or middle distinctly longer than *f*₃-height, and with a few or some distinct or strong setae discernible just above the row of *av*; *t*₁ with 1 *ad* and 1-2 *pv*; *t*₂ with 2-3 *av*, 1 *ad*, 2 *pd* and 3 *pv*; *t*₃ with 3 or 5 *av*, 2-3 *ad*, 3-4 strong and 3 weaker *pd* and 1-2 *pv*. Wings with costal thorns well developed, 1.6 times as long as *h*-vein; costal spinules prominent between *h*-vein and costal thorns.

Remarks. This new species shares with the preceding *pilicerca* the surstyli without a ventral notch. On the other hand, it is close to the succeeding *nishidai* in the cercal plate with deeply concave distal margin and with tuft of setae on less than distal half, the surstyli with large distal blade, and the distiphallus with much lengthened acrophallus. The 5th sternite with subapically constricted processes may be helpful in identifying *seticauda* without dissecting genitalia.

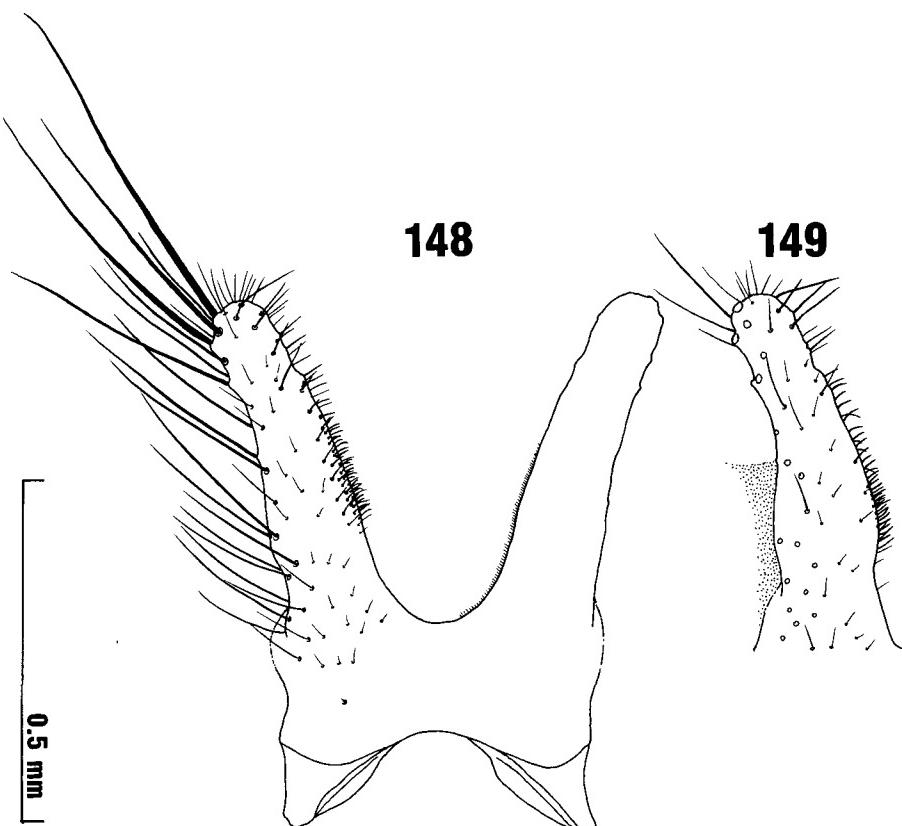


Figs. 140-147. *Phorbia seticauda* sp. nov., ♂. 140, hypopygium, dorsal view; 141, ditto, showing median part only, slightly caudal view; 142, ditto, lateral view; 143, left surstylius, inside to slightly dorsal view; 144, basiphallus and distiphallus; 145, distiphallus, ventral view; 146, left pregonite and postgonite; 147, right pregonite, inside view. Holotype from Bratang - Pisang.

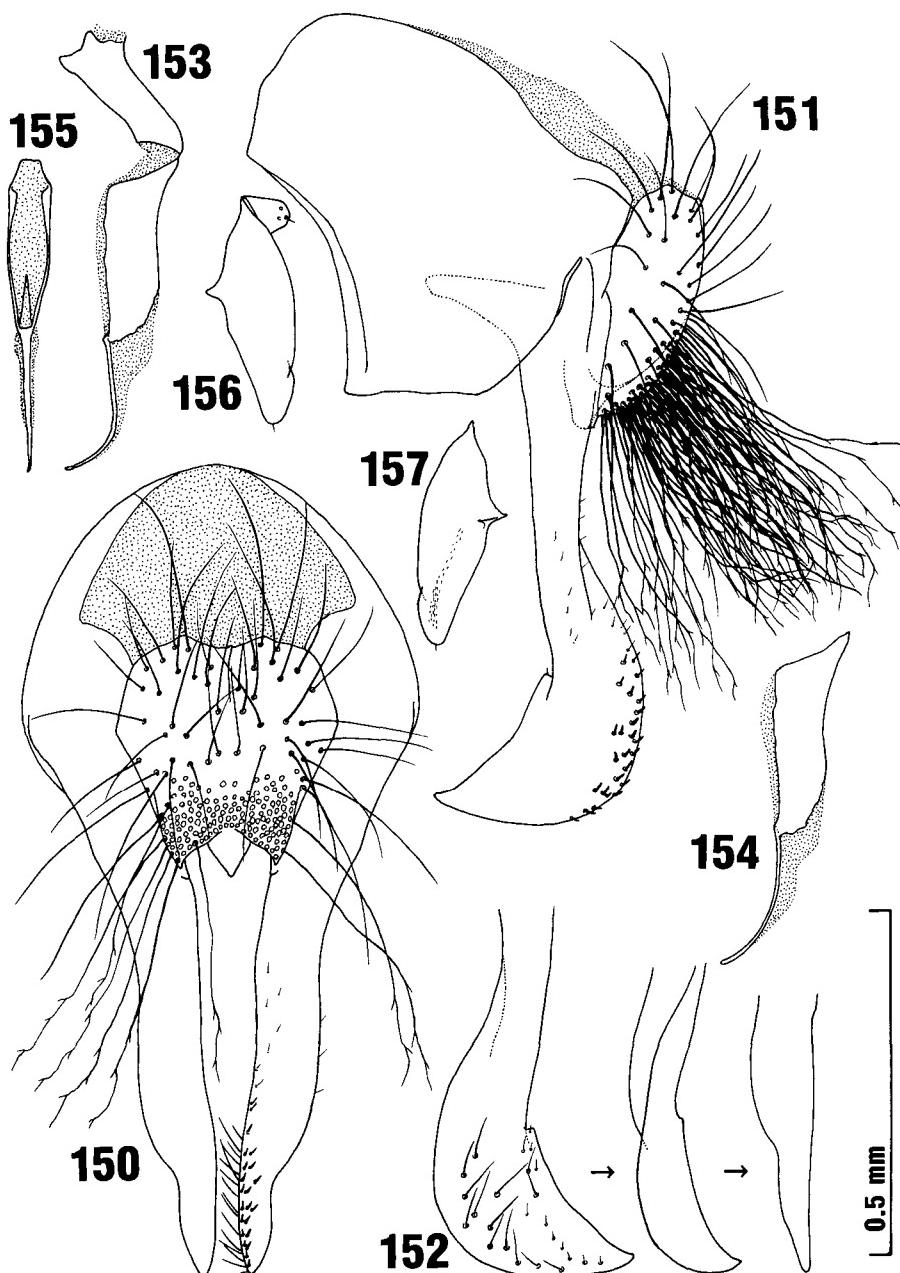
13. *Phorbia nishidai* sp. nov.
(Figs. 148–157, 171)

Type material. E. Nepal; Thudam, 3,500 m, 1♂ (holotype), 20. vi. 1972 (Y. Nishida), 1♂, 24. vi. 1972 (H. Shima), and 1♂, 26. vi. 1972 (MT, KU); NE of Thudam, 4,000 m, 2♂, 25. vi. 1972 (Y. Nishida & H. Shima). Two paratypes from Thudam are deposited in SEHU, and the others in BLKU.

♂. Wing-length 3.5–4.4 mm. Pollinosity pale grey or bluish grey, and partly tinged with brown; interfrontalia brownish grey; orbits and cheeks whitish grey, hardly to a little tinged with brown especially on linear part of parafrontals and on cheeks; mesonotum brownish along transverse suture and rows of setae, hardly to rather weakly tinged with brown between brownish vittae, the median and the paramedian brownish vittae being broadened posteriorly and united to each other; mesonotum largely blackish and partly pollinose in caudal view; abdomen thinly pale grey pollinose, slightly tinged with brown. Halteres yellow at knob, scarcely darkened.



Figs. 148–149. *Phorbia nishidai* sp. nov., ♂. 148, 5th sternite, ventral view; 149, process of 5th sternite, ventrolateral view. Paratype from Thudam.



Figs. 150-157. *Phorbia nishidai* sp. nov., ♂. 150, hypopygium, dorsal view; 151, ditto, lateral view; 152, left surstyli, inside to dorsal view; 153, basiphallus and distiphallus; 154, distiphallus; 155, ditto, ventral view; 156, left pregonite and postgonite; 157, left pregonite, inside view. Holotype (154) and paratype (150-153, 155-157) from Thudam.

Frons 1.8-2.2 times as wide as anterior ocellus; interfrontalia 1.3-1.8 times as wide as anterior ocellus, with *if* weak to strong; 3-4 strong and 0-1 fine *ori*; A_3 1.6-1.7 times as long as wide; arista with the longest hairs as long as or slightly longer than basal diameter of arista; orbits slightly to rather distinctly wider than A_3 ; cheeks slightly higher than orbital width; epistoma protruded nearly as far as parafrontal angle.

Mesonotum with no *pre-acr*, and with 2-4 (1-2 pairs) *post-acr*, including *prsc-acr*; 2nd *ph* fine; mesopleura with only 1 *pstg* and no associated setulae; scutellum sparsely haired ventrally, with some hairs discernible.

Abdomen with terminalia shaped as in the figures; 5th sternite with processes about thrice as long as median length of basal plate and rather sparsely setulose along inner margin; cercal plate with ventromedian keel well developed and well observable in dorsal view, and with a tuft of ramified setae covering less than distal half, most of the setae much longer than the plate; surstyli hardly convex ventrally, with distal blade discriminated from the stem by a distinct notch on ventral margin, and with small spine-like setae along and near dorsal edge of the blade; pregonites narrowly pilose inside, with a very minute setula discernible apically; acrophallus scarcely curved to the right apically; genital pouch with a membranous fingerstall-like process present on left side (Fig. 171) in addition to sack-shaped one on the right.

Mid femur with 3-4 strong *av* on median third, and 3-6 strong *pv* on basal half to two-thirds; f_3 with a row of 5-8 strong *av*, and with some *pv* on basal half to two-thirds, the strongest *pv* in median third variable in length, distinctly shorter to distinctly longer than f_3 -height; t_1 with 1 *ad*, and with 1 *pv* (0 on left leg in 1 specimen, 2 on right leg in another specimen); t_2 with 2 *av*, 1 *ad*, 2 *pd* and 2-3 *pv*; t_3 with 3 (4 in 1 specimen) *av*, 2 (3 on left leg in 1 specimen) *ad*, 2-4 strong and a few much weaker *pd* and 1 or a few (0 in 1 specimen) *pv*. Wings with costal thorns distinct or strong, a little to much longer than *h*-vein.

Remarks. Four of the 5 specimens available were dissected. The left process on the genital pouch is present in all the specimens dissected. This process and the ventral notch on the surstyli are unique to *nishidai*. Among the external features other than genitalia the mesopleura with only 1 *pstg* is also unique to this species. If this character is stable, it is useful, if not always be effective, in distinguishing *nishidai* without dissection of genitalia. In the other Nepalese species of *Phorbia* the mesopleura are armed with 2 *pstg* as usual, but in some of the *morula* group one of the 2 setae occasionally disappears. It is quite likely that the situation is also found in *pilicerca* and *seticauda*.

ACKNOWLEDGEMENTS

I am deeply grateful to Prof. H. Shima, Kyūshū University, who gave me the chance to study the collection of Nepalese Anthomyiidae made by the university expedition. I am thankful also to Prof. S. Takagi, Hokkaidō University, the leader of our research trip in Nepal, and Dr. K.C. Sharma, Agricultural Department of Nepal, the chief Nepalese partner of the trip, for their effort in realization of the project. Dr. V.K. Thapa, Tribhuvan University, gave me a great help in various ways during my stay in Nepal, 1983 and 1988.

My cordial thanks are due to Dr. N.P. Wyatt, Natural History Museum, London,

for his kindness in giving me the opportunity to examine the holotype of *P. morula*.

REFERENCES

- Ackland, D.M. 1967. Diptera from Nepal. Anthomyiidae. Bull. Br. Mus. nat. Hist. (Ent.) 20 : 105-139.
- Fan, Z., Chen, Z., Ma, Z. and Ge, F. 1982. On some new species of Anthomyiidae from China (Diptera). Contr. Shanghai Inst. Entomol. 2 (1981) : 221-239 (in Chinese with an English summary).
- Fan, Z. et al., 1988. Diptera: Anthomyiidae. Economic Insect Fauna of China 37. xiv+396 pp., 10 pls. (in Chinese with English descriptions of new taxa).
- Feng, Y., Liu, G. and Zhou, M. 1984. Three new species and one new record of the family Anthomyiidae from West Sichuan, China (Diptera). Entomotaxonomia 6 : 1-6 (in Chinese with an English summary).
- Hennig, W. 1966-1976. 63a. Anthomyiidae. In Lindner, E. (ed.), Die Fliegen der palaearktischen Region 7 (I). 1xxviii+974 pp., 114 pls.
- Huckett, H.C. 1929. New Canadian anthomyids belonging to the genus *Hylemyia* Rob.-Desv. (Muscidae, Diptera). Can. Ent. 61 : 93-96, 110-119, 136-144, 161-168, and 180-190.
- 1948. The subgenus *Phorbia* Robineau-Desvoidy in North America, genus *Hylemyia* sens. lat. (Diptera, Muscidae). Bull. Brookl. Ent. Soc. 42 (1947) : 109-125.
- Li, R. and Deng, A. 1981. Notes on Anthomyiidae from Mountain Emei, China. I. Description of 5 species. Acta Academiae Medicinae Sichuan 12 : 125-131 (in Chinese with an English summary).
- Michelsen, V. 1987. A new genus for *Chirosia hirtipes* Stein, and a reassessment of *Heterostyloides* Hennig (Diptera: Anthomyiidae). Ent. scand. 18 : 273-278.
- Suwa, M. 1974. Anthomyiidae of Japan (Diptera). Ins. matsum. n. s. 4 : 1-247.
- 1977. Anthomyiidae collected by the Hokkaido University Expeditions to Nepal Himalaya, 1968 and 1975 (Diptera). Ins. matsum. n. s. 10 : 17-51.
- 1984. The *atticola* group of *Pegomya*, with descriptions of some new species from Taiwan and Nepal (Diptera: Anthomyiidae). Ins. matsum. n. s. 29 : 1-38.

APPENDIX

FURTHER RECORDS OF PHORBIA, WITH OTHER ANTHOMYIIDAE FROM NEPAL AND INDIA BASED ON THE COLLECTION PRESERVED IN LUND UNIVERSITY

Through the courtesy of Dr. R. Danielsson, I have recently had an opportunity to examine material of Anthomyiidae collected from Nepal and India by Dr. P. Ardö (PA) in 1984 and by Dr. U. Gärdenfors (UG) in 1983, and preserved in the Zoological Museum, Lund University. The collection is composed of the following 14 species, including a few undetermined ones. Of them *Paregle densibarbata* is new to Nepal.

1. *Phorbia omeishanensis* Fan, 1982

Material examined. Nepal: 2 km NE Ghorapani, 2,500 m, grassy glades, Oak-*Rhododendron* forest, 24 km NW Pokhara, 1♂, 6. iv. 1983 (UG).

Distribution. China (Sichuan); Nepal.

The present specimen is much smaller than the specimens at hand of this species collected by myself in Nepal. The wing-length is 3 mm in the former, and 3.6-4.4 mm in the latter.

2. *Phorbia* sp. A

Material examined. Nepal : 2 km NE Ghorapani, 1♀, 6. iv. 1983 (UG).

There is the possibility that the present specimen is the female of *omeishanensis*.

3. *Phorbia* sp. B

Material examined. Nepal : Manang, 3,500-4,000 m, 1♀, 22. vi. 1984 (J. Ardö)

4. *Phorbia* sp. C

Material examined. India : Darjeeling, 1♀, 28. vi. 1984 (PA).

5. *Adia cinerella* (Fallén, 1824)

Material examined. Nepal : Kathmandu, numerous specimens of both sexes, 16. vi.-2. vii. 1984 (PA) ; Bardang, 2,900 m, 1♂, 5♀, 18. vi. 1984 (J. Ardö) ; Pokhara, 2♀, 14. vi. 1984 (PA) ; Gandrung, 2,000 m, grassy meadow, 19 km NW Pokhara, 5♀, 7. iv. 1983 (UG) ; Deorali pass, 3,000 m, grassy bald spot, *Abies-Rhododendron* forest, 22 km NW Pokhara, 2♀, 6. iv. 1983 (UG) ; 2 km NE Ghorapani, 1♂, 6. iv. 1983 (UG).

Distribution Oriental and Holarctic regions.

6. *Botanophila striolata* (Fallén, 1824)

Material examined. Nepal : 2 km NE Ghorapani, 6♂, 10♀, 6. iv. 1983 (UG).

Distribution. Palearctic region ; Nepal.

7. *Calythea setifrons* Ackland, 1968

Material examined. Nepal : Bardang, 15♀, 18. vi. 1984 (J. Ardö) ; Gandrung, 1♂, 1♀, 7. iv. 1983 (UG) ; 2 km NE Ghorapani, 1♂, 2♀, 6. iv. 1983 (UG). India : Darjeeling, 1♂, 28. vi. 1984 (PA).

Distribution. Northern part of Oriental region ; Tibet ; China.

8. *Delia bracata* (Rondani, 1866)

Material examined. Nepal : Kathmandu, 11♂, 9. vi. 1984 (PA), 2♂, 7♀, 16. vi. 1984 (PA), and 2♂, 7♀, 1-2. vii. 1984 (PA) ; Godawari, 2♀, 19. vi. 1984 (PA) ; Gandrung, 7♂, 22♀, 7. iv. 1983 (UG) ; Deorali pass, 2♂, 4♀, 6. iv. 1983 (UG) ; 2 km NE Ghorapani, 8♂, 42♀, 6. iv. 1983 (UG).

Distribution. Nepal ; India ; southern Palearctic region.

9. *Delia impilosa* Suwa, 1977

Material examined. Nepal : Godawari, 2,700 m, 1♂, 4. vii. 1984 (PA).

Distribution. Nepal.

10. *Delia platura* (Meigen, 1826)

Material examined. Nepal : Godawari, 1♂, 19. vi. 1984 (PA) ; Godawari, 2,700 m, 4♂, 4. vii. 1984 (PA) ; Mainepokhari, 2,000 m, 1♂, 6. vi. 1984 (PA) ; Gandrung, 1♂, 11♀, 7. iv. 1983 (UG) ; Deorali pass, 1♂, 1♀, 6. iv. 1983 (UG) ; 2 km NE Ghorapani, 2♂, 13♀, 6. iv. 1983 (UG).

Distribution. Cosmopolitan.

11. *Hylemya probabilis* Ackland, 1967

Material examined. Nepal : Deorali pass, 2♂, 6. iv. 1983 (UG).
Distribution. Nepal ; N. India ; China (Kansu).

12. *Lasiomma* sp.

Material examined. Nepal : 2 km NE Ghorapani, 2♀, 6. iv. 1983 (UG)

13. *Paregle densibarbata* Fan, 1982

Material examined. Nepal : Bardang, 1♀, 18. vi. 1984 (J. Ardö).

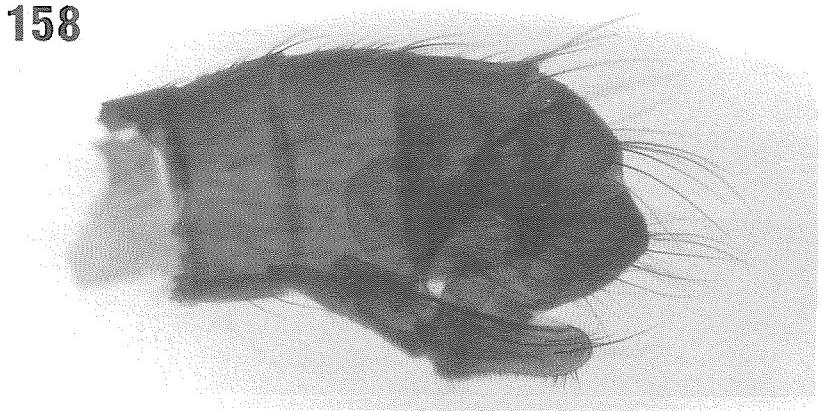
Distribution. China ; Nepal. This species is new to Nepal. In addition to the present material, there are at hand a lot of specimens of the species collected from various localities in Nepal.

14. *Pegomya quadriovittata* Karl, 1935

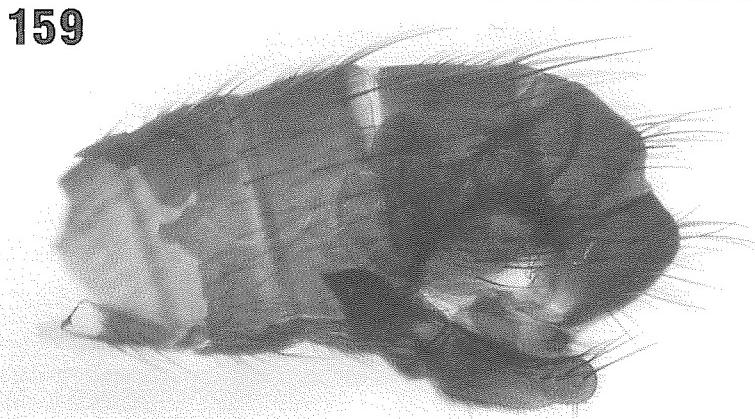
Material examined. India : Darjeeling, 1♂, 28. vi. 1984 (PA).

Distribution. Oriental and eastern Palearctic regions.

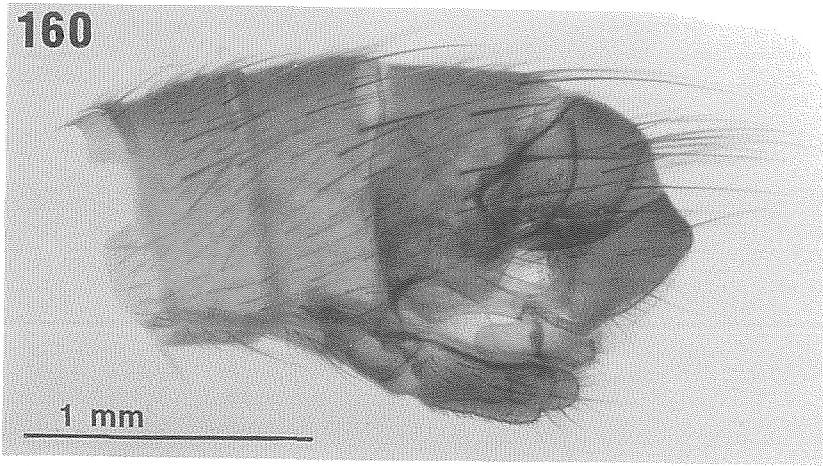
158



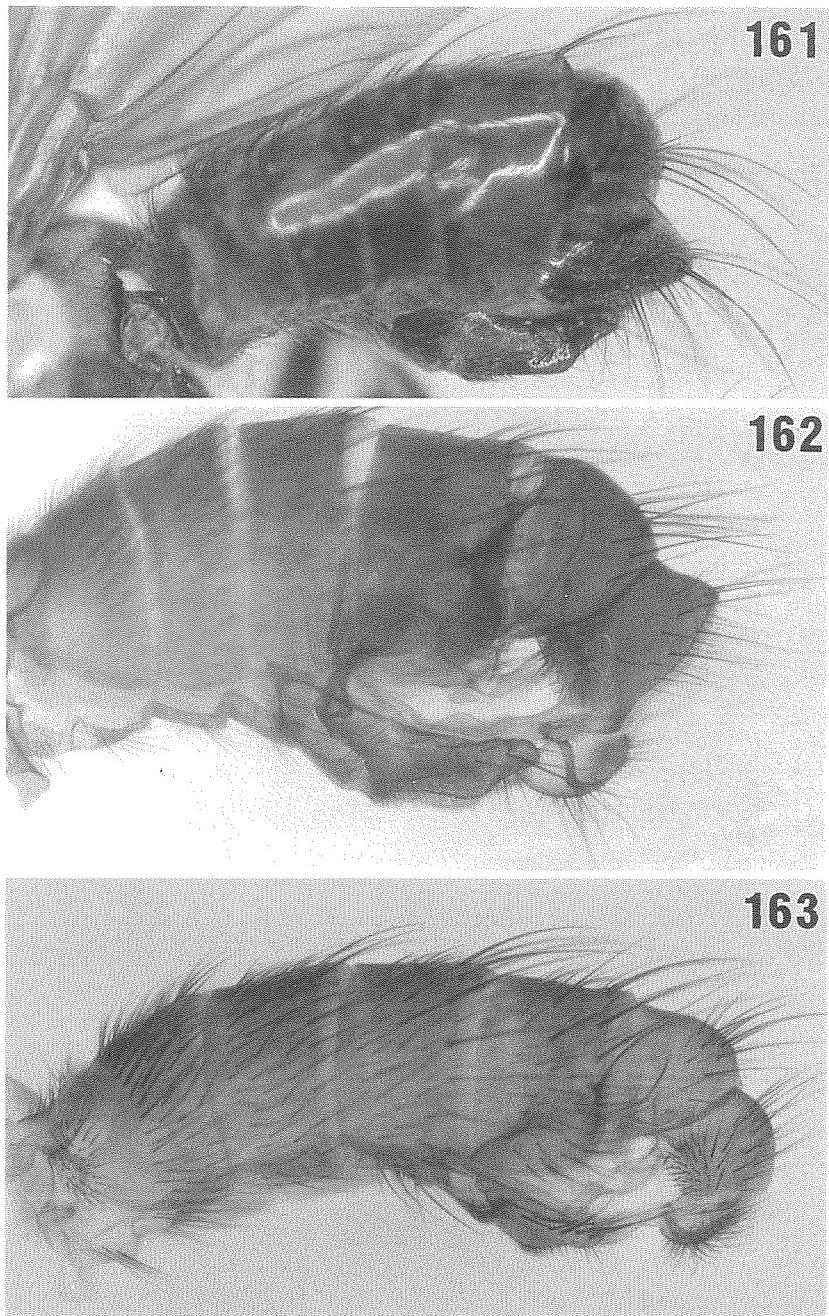
159



160



Figs. 158-160. Abdomen of *Phorbia* spp., ♂. 158, *morula* Ackland, Sing Gompa - Gosainkund; 159, *morulina* sp. nov., paratype, Kutumsang - Magen Gotha; 160, *omeishanensis* Fan, Magen Gotha - Thare Pati. Magnification same for the succeeding figures of abdomen.



Figs. 161-163. Abdomen of *Phorbia* spp., ♂. 161, *nepalensis* Suwa, Ghopte - Thare Pati; 162, ditto, Sing Gompa - Gosainkund; 163, *lobatoides* Suwa, Ghora Tabela - Langtang.

164

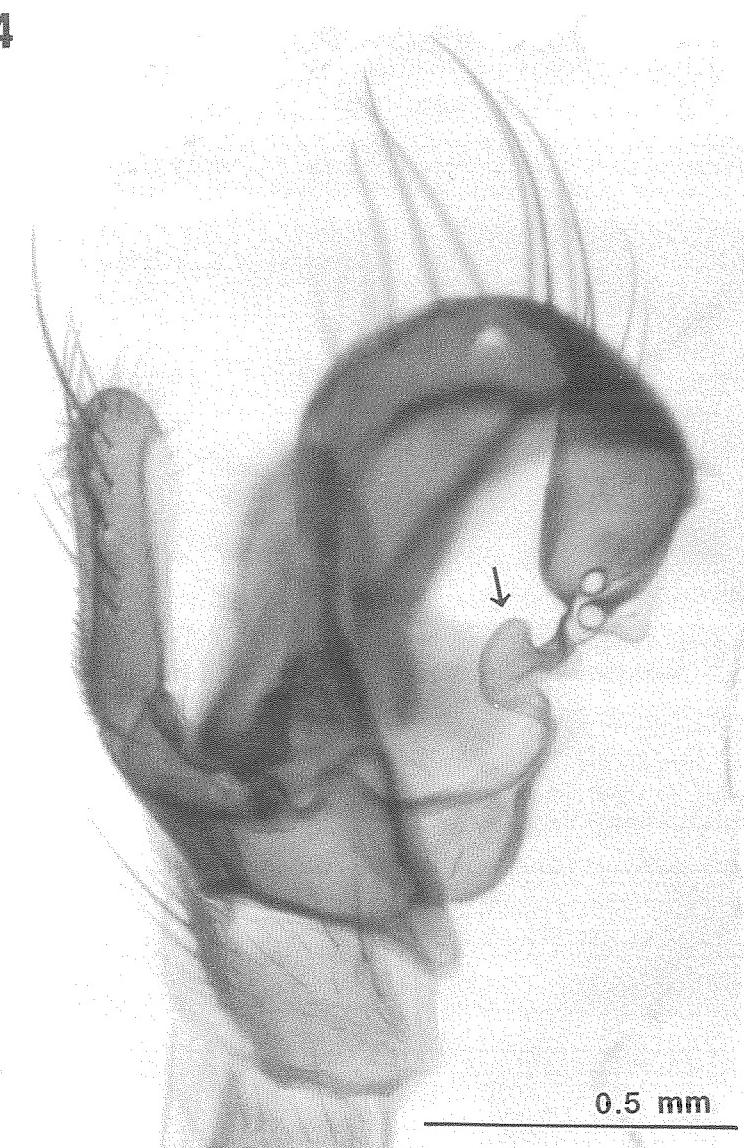
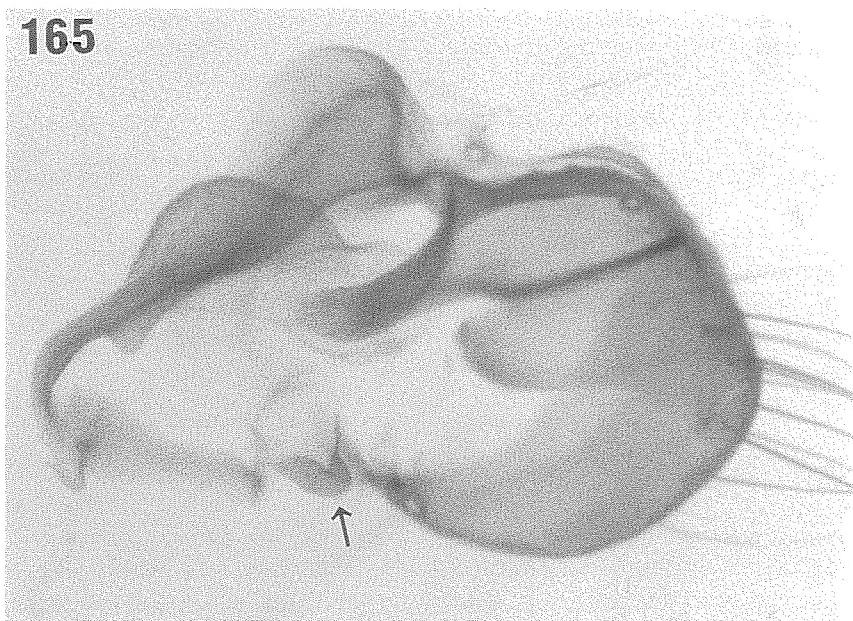
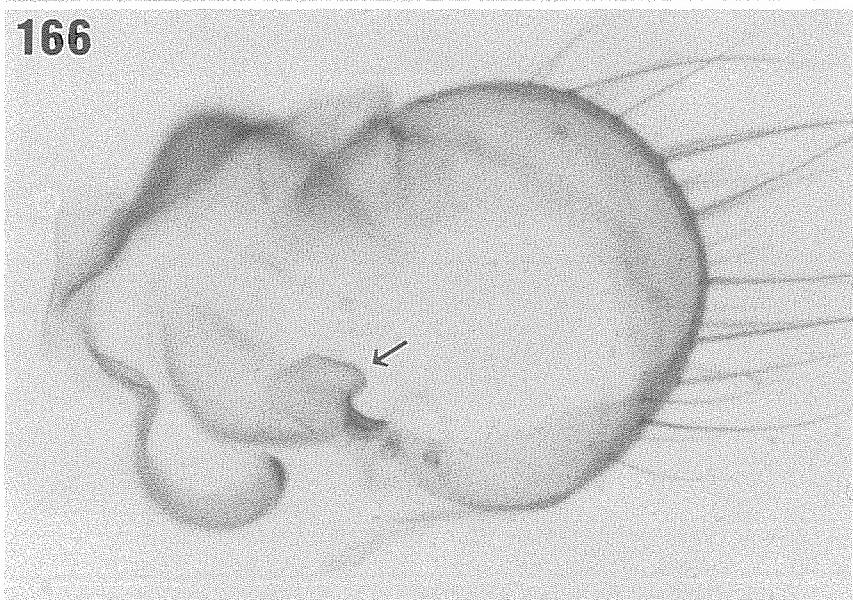


Fig. 164. Terminalia of *Phorbia morula* Ackland, ♂, right ventrolateral view, hypopygium detached. Arrow indicating the right process of genital pouch. Sing Gompa - Gosainkund. Magnification same for the succeeding figures.

165

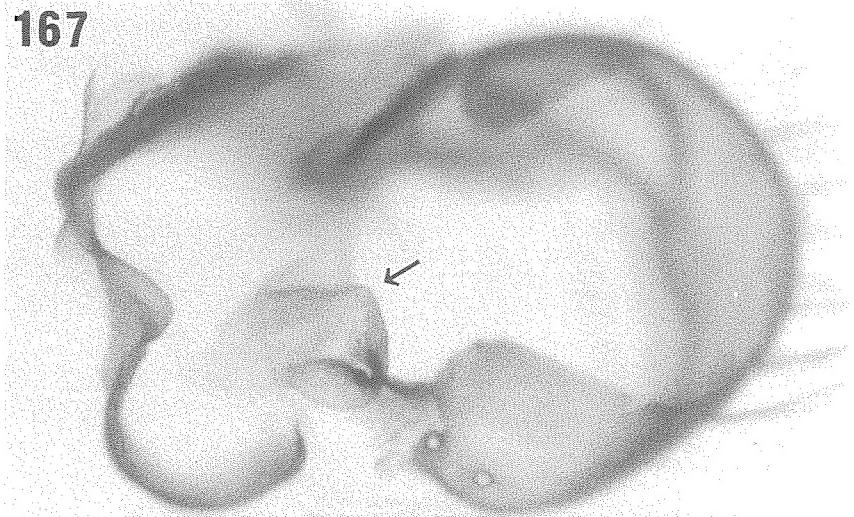


166



Figs. 165-166. Pregenital sclerite and 6th sternite of *Phorbia* spp., ♂. 165, *morula* Ackland, left ventrolateral view, Ghopte - Gosainkund; 166, *asymmetrica* Suwa, ventral and slightly right lateral view, Mt. Senjō, Nagano-ken, Japan. Arrow indicating the right process of genital pouch.

167



168

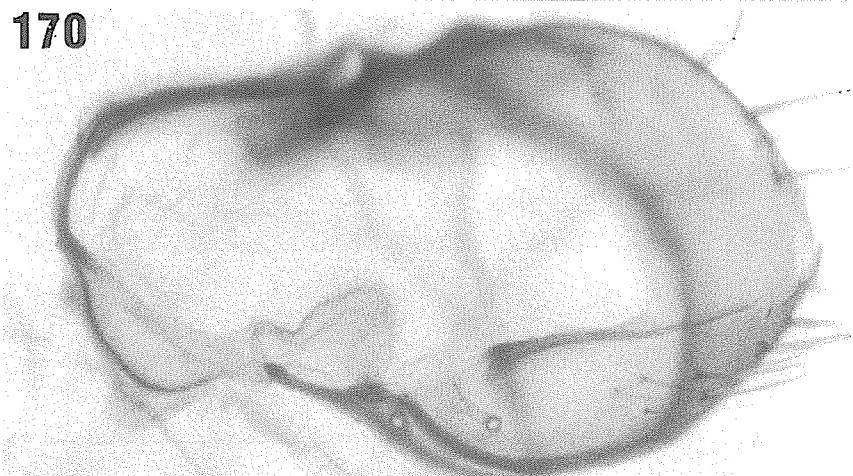


Figs. 167-168. Pregenital sclerite and 6th sternite of *Phorbia omeishanensis* Fan, ♂. 167, ventral and slightly right lateral view; 168, left ventrolateral view. Arrow indicating the right process of genital pouch. Magen Gotha - Thare Pati.

169



170

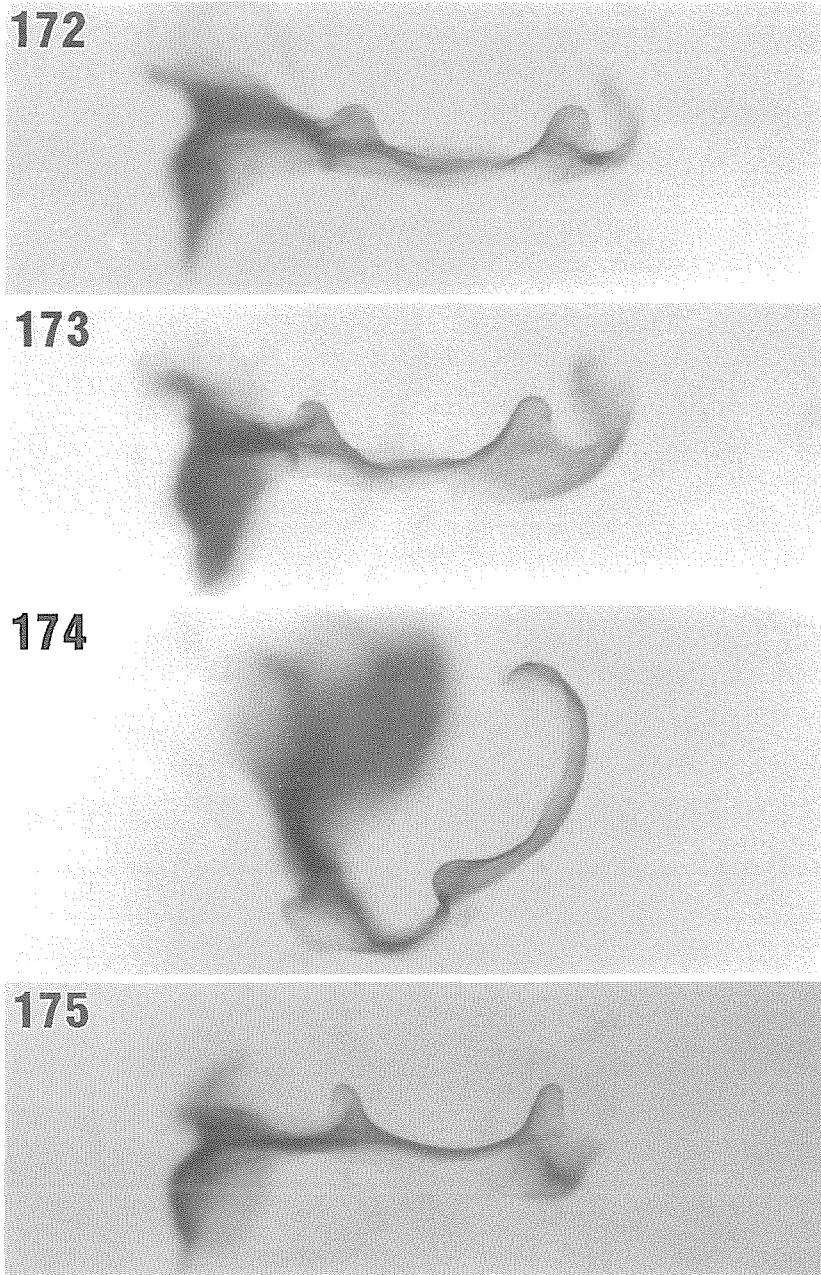


171

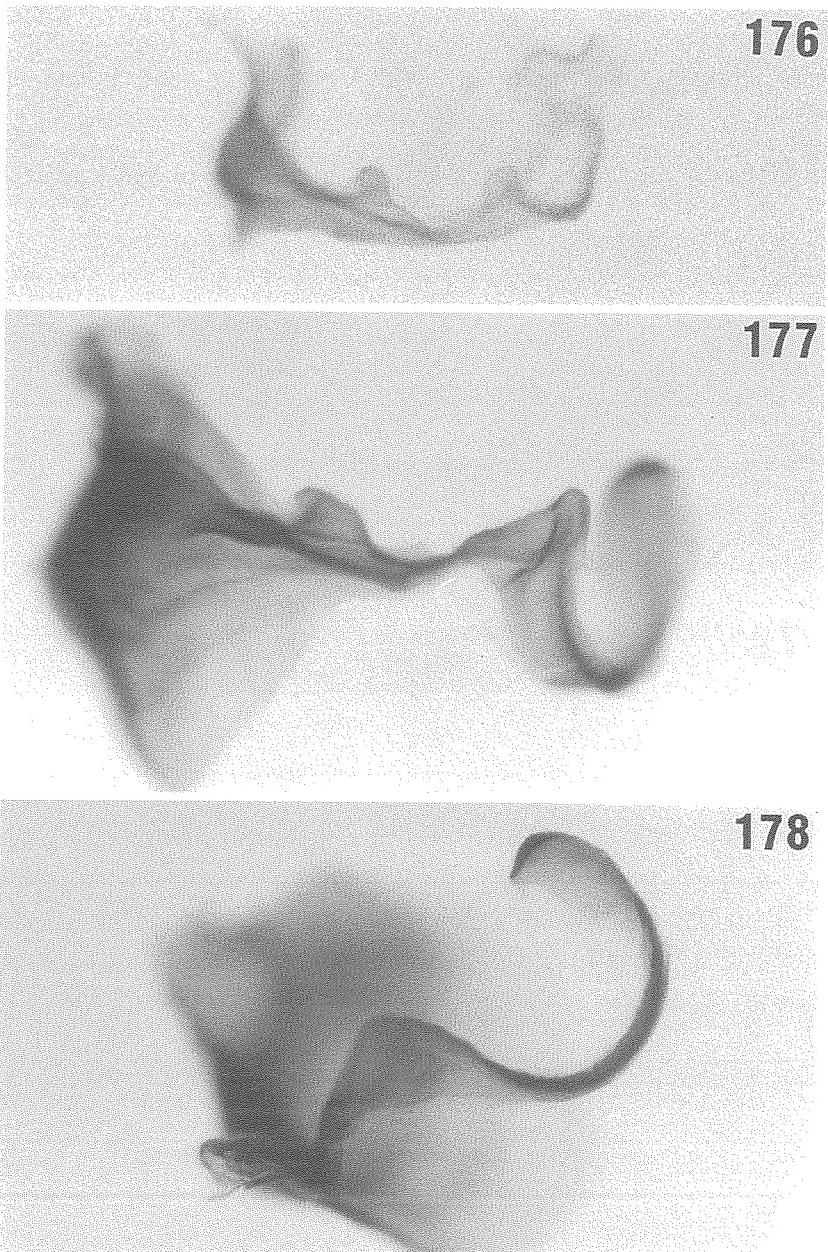


Figs. 169-170. Pregenital sclerite and 6th sternite of *Phorbia* spp., ♂. 169, *pilostyla* Suwa, right ventrolateral view, Nangaon; 170, *pilicerca* Suwa, right ventrolateral view, Ghopote - Gosainkund.

Fig. 171. Terminalia of *Phorbia nishidai* sp. nov., left lateral view, hypopygium detached. Arrow indicating the left process of genital pouch. Paratype from Thudam.



Figs. 172-175. Sixth sternite of *Phorbia* spp., ♂. 172, *morula* Ackland, ventral view, Sing Gompa - Gosainkund; 173, *morulina* sp. nov., ventral view, paratype, Kutumsang - Magen Gotha; 174, ditto, right ventrolateral view; 175, *subsymmetrica* Fan, ventral view, Ghora Tabela.



Figs. 176-178. Sixth sternite of *Phorbia* spp., ♂. 176. *minuta* sp. nov., ventral view, paratype, Magen Gotha - Thare Pati; 177, *nepalensis* Suwa, ventral view, Ghopte - Thare Pati; 178, ditto, right ventrolateral view.